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GAS JOURNAL

LIGHT • HEAT • POWER • BYE-PRODUCTS

[Founded in 1849 as the "Journal of Gas Lighting."]

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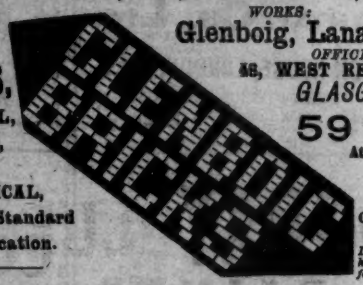

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VOL. CLXXII., No. 3258.] WEDNESDAY, OCTOBER 21, 1925. [77TH YEAR.

EDITORIAL NOTES.

A Timely and Invaluable Campaign.

WE congratulate the "B.C.G.A.," and the industry it exists to serve, on the special "educative campaign" it has recently launched. The Essay Competition, not for those engaged in the gas industry or their relatives, but for the general body of the public, was a happy inspiration, which we are glad—though not surprised—to hear has met with a great response. From all quarters of the country, thousands of requests for information and the means for competing are being received; and Grosvenor Gardens is snowed under with correspondence and crowded with callers. As we have said, we are not surprised; for the competition has been very thoroughly and attractively advertised, both nationally and by the co-operation of many undertakings in their own districts.

The preliminary advertisement of the competition is being followed by a series of statements concerning the past achievements and future possibilities of the gas industry in the service of the nation; its relation in that service to the electrical industry; the limitations which bound the possibilities of electricity in a country whose basic source of energy is coal, and not water power; and the truth regarding coal conservation. These statements contain nothing with which we in the gas industry are not thoroughly familiar—up to the point, perhaps, of boredom. But who that has sought to discuss them with Members of Parliament or of Local Authorities, or with prominent men of business, or with editors and journalists, or with the ordinary man or woman in the street, is under the delusion that they are familiar to those not in the gas industry, except a handful of scientists and students? We are all of us much too prone to think that what we know is a matter of common knowledge, and to omit the steps necessary to make it so if that be important to our welfare. We believe there are, even to-day, chairmen of gas companies regarding themselves as competent administrators who do not consider the advertising of the many uses, advantages, and public services of gas as necessary or profitable. Yet we wonder how much they would know of all the other services which the manufacturers and traders of this and other countries have to offer them, were it not for advertisement and publicity of all sorts. How in the name of common sense can we expect the mass of our fellow men and women in these days of full, hurried, and complex existence to search out for themselves, unaided, the truth about the gas industry, either in relation to their daily needs or to the nation's problems? And how can we bring those truths attractively, clearly, and convincingly before them constantly except by persistent publicity?

"If it must be done, let us do it locally," says someone. By all means, do all you can locally to educate your public; but no one who has thought the matter out thoroughly can possibly believe that the local statement of a local gas undertaking on a subject of national importance and fundamental character can carry anything like the weight of an authoritative statement by a national organization. Moreover, thousands of people read national publications who never read local papers or the circulars of local traders; and it is the papers of national or wide-area circulation that create public opinion and affect parliamentary action.

That is why we so warmly welcome the very timely campaign of the "B.C.G.A.," which, we hope, they will have money enough to continue right through the winter. We say "timely," because it comes at the right moment to drive home, and to supplement very widely, the valuable work that has been done this past summer by the National Gas Council and its President, Mr. D. Milne Watson. The Government are wavering in their once unqualified faith in electricity and low-temperature carbonization as panaceas for industrial depression and widespread unemployment. M.P.'s are feeling very qualmish about subsidies and about State interference with industry. Our electrical friends who favour State-aided schemes—principally the makers of electrical plant for generation and distribution, and the Electricity Commissioners, to whom Government interference is as the breath of their nostrils (there are, of course, many sceptics among the wiser heads engaged in the administration of the electricity supply industry)—are busy "gingering-up" the hesitating politicians, who have been made to think. Now, indeed, is the time to inform public opinion of the facts; to tell them what the high-temperature carbonization industry has already done, and what it can do, for the country; what is the right way to use coal; and what are the limitations of electricity in a "Coal Power" country, which limitations have to be remembered as well as its many possibilities if the nation's best interests are to be served. We therefore welcome heartily, and strongly endorse, the action of the "B.C.G.A.," and hope they will receive from all quarters the financial backing needed in unstinted measure.

The Passing of a Friend and Colleague.

ANOTHER prominent figure in Metropolitan gas circles has received the final call; and a fresh blank has been created in our midst which cannot be filled, for the reason that there is no person in the Metropolitan gas industry who has precisely the same attributes which Hubert Dynes Ellis possessed in such full measure. It is frequently said that man passes, his place is filled, and the affairs of that part of the world in which he was active go on much the same as ever. That is true up to a point; but the successor may have a different personality, different attainments, different methods which may not make the replacement so complete that the one who has gone is not missed. Many will miss him who passed from among us last Wednesday. It was not in gas engineering that Mr. Ellis made his mark, though he was a contemporary in Metropolitan gas affairs of Sir George Livesey, Sir Corbet Woodall, Mr. H. E. Jones, Mr. Charles Hunt, and numerous others; but his talents—particularly those of financial, legal, and administrative order—made him one of them, during and since that long period of his occupancy of the office of Secretary to the Commercial Gas Company. He was erudite; he had a scholar's ways which permeated his whole official and administrative career. The precision and completeness of the study were carried into the very minutiæ of daily work. This characteristic, combined with his breadth of knowledge, gave confidence in his counsel; and this, always unobtrusively given, was founded not on knowledge only, but on a wisdom and circumspection which few can hope to, or do, possess—much less when fourscore years of life have been well passed. He was a man of many parts, and every part sound; and his mental capacity had its counterpart in a marvellous physical fitness, which was the envy of many men much younger in years. "*Orando laborando*"—the motto of Rugby—went with him and into his work through life.

The buoyancy of youth also persisted, as we knew by numerous incidents—among others an experience one day at Cambridge, when we found he could talk with a modern Rugby boy of experiences as though decades were but a brief interval between respective scholastic days. With him there was constant contact, inasmuch as, though perhaps few knew it, for nearly forty years, until recent times, he was responsible for the "Journal" Stock and Share Market report and table of movements in values. Rarely during that long period was there an error; and never did his weekly contribution miss presentation at this office at the appointed time, save on one or two occasions through delay in the post. That is an illustration of the methods of one the memory of whose fine presence and mental gifts we shall ever treasure; but, above all, never fading will be a loyal friendship, a transparent frankness, and a breeziness which were inseparable from a healthy mind and great physical fitness. To-day we forgive him even those occasions when he has induced us to tramp with him through the streets of London because exercise was good, when a twopenny 'bus ride would have taken us quicker to our destination. He was right in this small matter as in most other larger ones. Hubert Dynes Ellis was in many ways a great example. Details of his association with the gas industry are given in our "Obituary" notes.

Carbonizing and Purification Plant at Stockton.

There is never need for the President of a technical gas organization who has been carrying out plant reconstruction or extension work to make any sort of apology for utilizing the fact and the material in his Inaugural Address to the members. Really new descriptive work of an engineering character in the gas industry is to-day more noticeable for its infrequency than otherwise; and this is largely due to the imposing parts of the gas plant having again become more or less standardized, with differences only in capacity and therefore measurements, or in incorporated new detail. Often one finds greater variations in the operating methods of such plants than in the structural embodiment itself. It is because of this similarity of types that many Presidents engage in their addresses in discussing current movements, problems, and policies in the industry; and, verily, of them there are so many that the compassing and keeping abreast of them all is something which exacts much from the administrators and executive officials of gas undertakings. At the same time, those movements, problems, and policies cannot, and must not, be neglected. The protection and promotion of the interests of the gas industry will not allow it. But it is refreshing, when opportunity permits, to turn aside and consider a practical piece of gas engineering work which has been carried out, and the results of which the responsible engineer can produce in justification for what he has done.

Research, we all agree, is highly necessary for the advancement of efficiency in the ways of doing things, as well as for discovery; but research begets research. When the designers and constructors of plant have incorporated in their own particular types the fruits of research, then the engineer upon whom falls the duty of selection has to make further exhaustive research to ascertain which will best suit his site and his local circumstances, and has to strike a balance to realize the maximum advantage. In the Presidential Address of Mr. W. W. Atley, of Stockton-on-Tees, to the North of England Gas Managers' Association, we trace careful study of conditions and needs before coming to any conclusion as to the lines of reorganization and construction of the carbonizing and purifying plants at the Stockton Corporation Gas-Works. It was a matter not only for care but anxiety, in view of the congested nature of the site, and the oppressive conditions which existed between capacity and demand when Mr. Atley took charge of the works. Now that the large piece of work has been done, and we find that the outstanding capital this year—the balance remaining after the operation of the sinking fund—is only £100,697, which is about £196 per million c.ft. of gas sold and used on the works, then there is good cause for congratulating all concerned. This, combined with the data given later regarding the economical results and efficient working of the new plant, supplies more than justification for Mr. Atley's plans for putting the Stockton Gas-Works in condition to meet requirements. But the probability is that some day when new standards of productive efficiency no longer enable more gas to be produced from the present works, a new and more accommodating site will have to be found. But that time is not yet.

Concerning the new carbonizing plant, it will be seen that the President adopted Drakes' horizontal settings, with combined charging and discharging machine, and a complete equipment of coal-handling plant. The details are given in the address. But there will be a good deal of concentration on the table supplying the carbonizing performances and costs. From this it will be seen how considerably modern methods contribute to a reduction of labour and costs even with horizontal retorts. The point will probably be made that this is due more to highly efficient mechanical handling of materials than to the retorts themselves. But the data disclose that both are contributory. With the old bench and eight-hour charges, the wages costs (the number of men employed is set out in detail) per ton of coal carbonized were 6s. 1·94d., and per 1000 c.ft. of gas made 6·55d. The corresponding figures under the new order of things (with twelve-hour charges) are 1s. 10·8d. and 1·76d.—a reduction of 4s. 3·14d. per ton, and 4·79d. per 1000 c.ft. respectively. This is Mr. Atley's justification, and so is the increase in the make of gas per ton from 11,283 c.ft. to 13,000 c.ft.—the latter with a higher calorific value than the former, so that the therms per ton are also much higher. There is one point, however, which is somewhat inexplicable. We take it that the coal carbonized in the old and the new plants was of approximately the same character. If that is so, we cannot understand only 420 B.Th.U. per cubic foot being attributed to the lower make per ton under the old system, unless the figure refers to coal gas diluted with water gas. If there is no error here, then with the increased volume per ton and higher calorific value per cubic foot, the make of therms has increased with the new plant by no less than 20 per ton of coal carbonized.

The new purifying plant is also fully described in the address. The contractors were Messrs. Ashmore, Benson, Pease, & Co., Ltd. Again it will be seen how the new plant has effected savings in the purifying costs, though, of course, not of such a striking character as in the case of the carbonizing plant. Adjusting the actual cost of wages paid in 1920-21 to the rates paid in 1924-25 for the purpose of accurate comparison, the cost of purification in 1920-21 was 0·293d. per 1000 c.ft., compared with 0·223d. last year with the new purifiers—a reduction of 23·89 p.ct. That 0·223d. has a remarkably healthy appearance, when contrasted with available purification data applying to many other concerns.

The address will be read with considerable interest by gas engineers when confronted with the need for reconstruction or extension plant.

Economies of Silica.

The value of the paper which Mr. A. H. Middleton, of the Consett Iron Company, Ltd., read at the meeting of the North of England Gas Managers' Association lies in two directions. It was on "Refractory Materials in Carbonizing Practice," which is a subject into which there can be imported a large amount of technicality. The paper, however, gives in plain language the whys and the wherefores of silica material being preferable in carbonizing structures to fireclay or semi-silica (or half ganister); and the information is supplied by a writer who can speak not only from the point of view of a manufacturer of refractories, but as one with direct home experience of their use in coke-oven practice, in which the most crucial tests can be obtained. We are learning day by day that silica material, albeit it may be more expensive initially than refractories that are passing for high-temperature work, is economical owing to the economies that its use promotes, as well as the greater margin which it gives in the case of temperatures being pushed above normal in an emergency or accidentally. Those are important considerations in these days. It is in these respects—apart from the contained good counsel with its backing of experience—that Mr. Middleton's paper will have great

influence. The whole of the contribution should be read, because it enables comparison of the performances of silica to be made with those of fireclay and semi-silica.

In America and on the Continent the growth in popularity of silica material has been more rapid than in this country; but here it is now being adopted apace. All makers can give a proof of this; and in the short time since the Consett Iron Company decided to adopt silica for their own carbonizing plant, they have supplied silica material to upwards of forty gas undertakings. There are several reasons for this favour, and one alone should secure the adoption of silica in all coal carbonizing plants worked at modern temperatures. With this material no softening occurs until a temperature of at least 1670° C. is reached; and absolute rigidity is maintained right up to the point of collapse, which point is nearly 300° higher than that at which it is safe to use other refractories for retort-settings or coke-oven walls. Thus it is seen that in it there is a large margin of safety; and it is quite unlikely that under any gas-works conditions a silica setting could be burnt down. There is thus very strong ground for Mr. Middleton's conviction that for carbonizing purposes silica materials will soon entirely displace other refractories in this country.

There are other advantages. In addition to the higher temperatures that can be employed, there is better conductivity. Throughput can therefore be increased, although any increase through a shortened carbonizing period must mean the adjustment of the hours of charging. This is shown in the paper by citing some comparative results from two coking works in one of which the walls of the ovens are built of silica (17¾ in. wide), and in the other of semi-silica, or half ganister (21 in. wide). In the silica ovens, with a temperature at the point of combustion of 1370° C., the coking time is 15 hours; in the semi-silica ones, with a temperature of 1320° C., the coking time is 26 hours—a difference of 11 hours. The same coal was used, and all other conditions were identical. Mr. Middleton, anticipating criticism owing to the difference in the widths of the walls, points out that with a difference of only 50° C. in temperature, the rate of heat penetration went up from $\frac{18}{32}$ in. per hour (semi-silica) to $\frac{19}{32}$ in. with the silica retorts—an increase of 46·1 p.ct. The ability which higher temperatures give with silica to save time is further illustrated by the results of another tabulation for the silica plant. With 1100° C. average flue temperature, the carbonizing time was 30 hours; with 1330° C., 20 hours 17 mins.; with 1375° C., 15 hours 30 mins. The conclusion the author draws—and the figures support him—is that, by using silica in place of semi-silica, the throughput of a carbonizing plant might be increased almost 50 p.ct.; and this is to the credit of the silica. Throughput increase, of course, means a reduction of expenditure per ton of coal. There is one point upon which it would be of interest to the gas engineer to have further information from Mr. Middleton, if he is in a position to give it, or could obtain it, to supplement his paper—that is, a statement of the quantities of products per ton of coal, with analyses of the gas and liquid products under the different temperature conditions with silica and the semi-silica ovens. The difference in temperature being only 50° C. would not suggest any appreciable variations in qualities, but the reduced width of walls and the more rapid heat penetration through the charge might make some difference, which anyway should be more than compensated—if there is a downward difference worth notice—by the ability to increase the throughput. The point is merely one of interest, and not of criticism.

The early troubles with silica goods through insufficient heat treatment have been overcome, and permanent expansion is now fully established before the silica products leave the manufacturers. The thermal, or reversible, expansion is also now dealt with so effectually that even the huge block of silica construction in a coke-oven plant can be heated-up, kept in perfect alignment, and worked under varying temperature conditions, without damage to a single brick. If this is so in such a structure, then, as Mr. Middleton says, there is no reason why similar results should not obtain in gas-works constructions. The proof has been obtained in America; and corresponding evidence is accumulating in this country, which should completely set at rest any fears engendered by early experiences which were not of the first order. Many other practical points are made in the paper, which will be noted by gas engineers—particularly the one regarding the importance of a properly constituted jointing cement.

Prof. Cobb on the Place of the Gas Industry.

An article bearing the title of "Electricity and Coal Consumption," but which goes much farther than the title conveys, appears in the current number of the "Edinburgh Review." It is by Prof. J. W. Cobb, C.B.E., and is intended for the edification of the public, our political rulers, and all others whom it may concern. Among those "others" are the men of the gas industry. While there is much in the article upon which we are all more or less informed (especially, as to our position in relation to other aspirants in the markets of heat, power, and light), there is also applied sufficient of that little used but valuable means of chastening and qualifying ideas and faith—introspection—to induce a resolution that in future there shall be no gilding of our performances and capacities to give them an appearance beyond actual deserts. It is neatly done in the article—nothing direct, nothing obtrusive, but it is there. We must not claim, or insinuate that we are able to do, more than that of which we are capable. We do not wish to do so; but sometimes there is evident a proneness to slip from the path of virtue. But we comfort ourselves that we sin less in this respect than at any rate one of our rivals. And we rise from a study of the interesting survey by our friend at Leeds, with the knowledge that he has made it from his independent standpoint and on grounds which are fundamentally correct, and that he leaves his friends of the gas industry standing firmly upon ground at a level superior to that of any competitor—viewed from the heights provided by the combination of thermal, chemical, and physical knowledge, and an intimate acquaintance with needs. We are a little doubtful whether Prof. Cobb had any idea in writing this article of compelling his gas friends to see their limitations, but it is an excellent thing to have (if not recognized) such limitations pointed out, in order that efforts may be made to break through them.

The article dissects and examines past treatment of the problem of heat, power, and light supply in this country, which has been partial, inconclusive, and wholly misleading ever since the Coal Conservation Committee set to work in 1916, and thereafter issued their report. Perhaps there has never been a report that has been so mischievous in wrong leading, and "in penetrating the mentality of the various political parties in search of new remedies for the continuing depression of our industries." We should imagine that the members of that Committee must be, on the one hand, annoyed at the exposure there has been of the strength of their imagination and fabulous predictions, while, on the other hand, elated over the success that they have had in making impressions, by the employment of the spectacular, on political, literary, and lay minds. They have conquered by quixotic methods, if they have not succeeded in practical achievement—unless they can find it in their own minds to claim as such the fact that they have helped to persuade the present Government that they ought to assist electricity to win a place which it could not win by its own merits and exertions. As Prof. Cobb points out, the present time is particularly unsuitable for the application of the methods proposed—not only owing to the poor efficiency in the utilization of coal as presented by electricity generation, but in view of the activity now being displayed in developing the economical utilization of fuel by existing methods and the discovering of new ones. The author of the article has no difficulty in showing the loss of heat that arises from the electricity generating process, and the high efficiency of gas-works carbonizing processes. The points are made succinctly and clearly, so that even the lay reader cannot escape them and their meaning. In this connection, a consideration which is often overlooked is that "the value of a heat unit is increased several times for general use when it appears in the gas instead of in the coal. The extent of the appreciation in value varies widely; but it is probably safe to take it that for continuous heating the effectiveness of the heat unit is doubled, and for intermittent

heating quadrupled. This undoubted increase in thermal value, reflected in the corresponding monetary value, arises from the possibility of using gas in a controlled and scientific manner, in apparatus embodying refinements of design which are inapplicable to the cruder coal-consuming appliances."

Prof. Cobb sketches for his readers some of the advances which have been made in gas-works carbonizing and gasifying processes, which have increased their efficiency; and, as efficiency has increased, it has been accompanied by growth in the utilization of gas as a fuel, both for domestic and for industrial purposes. This is where we come across the first statement which suggests there should be introspection. To realize a greater rate of progress, we must work to break through our present limitations. With (say) 80 heat units out of every 100 in the coal available in our products, and only 20 units expended in the process, there is not much room for reducing the price of gas by augmented efficiency in production. There we have a limitation; and a limit to the replacement of raw coal for heating purposes by gas as now manufactured is (as our mentor says) set by its price. But the price of gas is not a product of efficiency alone, but of a complexity of factors, in which the markets for coal and secondary products play an imposing part, and labour charges, maintenance costs, rates and taxes, &c., also have their incidences in greater or less degree. It is in all these directions that we look for contribution to enable us to offer our heating agents at prices which will contribute more and more to the replacement of raw coal. In the gas industry we are prone to measure our successes by the increase in the consumption and applications of gas; and the desire always exists to make our prices such that the rate of progress shall be hastened. But it would not do our industry any harm if we could sometimes consider our progress from the point of view of the reduction made by gas and coke in the consumption of raw coal for domestic and industrial purposes. The difficulty of doing this is, of course, that the data are not readily available, and the millions of tons mentioned by Prof. Cobb as being used for this and that purpose are only approximate ones—more accurate perhaps in the case of the gas, coke-oven, and electricity industries than in the other classifications, in which calculations are made on more or less hypothetical bases. However, as Prof. Cobb points out, every improvement and economy extends the margin of possible economical employment for gas, coke, and electricity; but "nothing like the total replacement of raw coal which is sometimes visualized can be regarded as economically within sight as long as prices for coal gas and electricity remain at anything like their present levels." Therefore, there must be constant examination and effort to produce those conditions which will enable us to lower the price of gas by change of operations, reduction of expenditure, and making our products still more valuable in the markets.

At the same time, there is another difficulty which is slow to yield to the most eloquent persuasion, and that is to get the public to see that they should transfer something to the credit of gaseous fuel for the labour it saves and the inconveniences of storage and dirt of which it disposes. In this relation, we come again into contact with a matter which invites a little introspection, in order that, if we are guilty, we may mend our ways. We read (and we agree) that the straightest path to the smokeless city lies through the products of coal carbonization. Then there comes the accusation that "the direct cost in loss of fuel value by smoke emission is the subject of much well-meaning exaggeration; but the indirect cost from dirt, acid fumes, and exclusion of sunlight, the exacting labour of constant cleaning, the destruction of beautiful things, and the diminished vitality of human beings and plants, is undoubtedly very large, and not of a kind to be assessed in terms of money alone." Wherever it applies, the charge of "well-meaning exaggeration" must be accepted; and, so far as is necessary, there must be reformation in our propaganda against the pollution of the atmosphere by the filthy emanations of chimneys. We have sometimes wondered as to the bases on which these statements originated, and whether it may not be that there is not exaggeration, but under-estimation. However, after introspection, we must all endeavour to keep within the bounds of truth; there is not the slightest reason, so far as the gas industry is concerned, why we should step outside.

These are only a few points which occur from the perusal of the interesting and instructive article, which goes much farther and much deeper. It reveals the indispensability to the nation of coal carbonization—particularly by high-temperature methods; it divulges the vast exploration which is going on, as well as the potentialities of that exploration. Thus is accentuated the error the Government have made in treating electricity as the only consideration in respect of the country's requirements for heat, power, and light.

Co-operative Distillation of Tar.

As time passes, it becomes more evident that the quality of dehydrated tar required for the making and maintenance of roads must receive very serious consideration; and it is a *sine quâ non* that there should be no ground for complaint in this respect. It is not always possible for gas companies with limited facilities to guarantee the required quality; and it therefore becomes necessary for them to consider alternative methods of disposing of their crude tar to advantage. It appears to us that the system of co-operation between gas company and tar distiller in operation in many parts of the country to-day deserves the serious consideration of all companies who do not distil their own tar. Our information is that the results of these schemes tend to show an increasing return to the companies, subject always to the variations in the value of coal-tar products.

Because of this, and owing to the importance of realizing the utmost value from our secondary products, we make a departure from our rule of not referring to advertisements in our editorial columns. Our advertisement columns have drawn attention to the schemes operated by Messrs. Burt, Boulton, & Haywood, Ltd., whose head office is at Salisbury House, London Wall, E.C., and whose works and offices spread throughout the world. This Company were one of the earliest in the country to realize the possibilities of coal-tar distillation, and founded their original distillery at Millwall in 1856. Since that time their chemists have been constantly engaged in research work directly connected with coal tar and its products; and to-day the Company hold an unassailable position among tar distillers. With foresight, the Directors saw that co-operation with the producers of the raw material was essential to the continued success of the industry; and to this end they initiated co-operative distillation schemes, both here and in connection with their Continental works.

In London and the Home Counties the Company have the Prince Regent's Tar Distilleries Scheme, in which upwards of twenty-five gas companies participate—sending their tar to be distilled at the Silvertown Works in London. In the South and West of England the Company are associated with Messrs. T. H. Harvey, the Plymouth & Stonehouse Gas & Coke Company, and the Swindon United Gas Company, in the South-Western Tar Distilleries, with works at Eling (Southampton), Stamshaw (Portsmouth), Plymouth, and Swindon, at which tar is distilled on a co-operative basis for practically the whole of the gas undertakings in that area. In South Wales they are interested with Messrs. Bird & Son, Ltd., of Cardiff, in the operation of the South Wales Tar Distilleries. On the Continent at the Company's works in France, Spain, and Belgium, similar schemes are worked with some of the most important gas and coke-oven companies. The experience everywhere has been good; and therefore the matter of co-operation for this purpose may be strongly commended.

Special Orders and Objectors.

There will be general agreement with the action of the National Gas Council in supporting the Great Yarmouth Gas Company in their protest against opposition in Parliament to a clause in their Special Order when objection was not raised at the time the Order was before the Board of Trade.

The point is important to the gas industry, for this sort of thing might go on, and land promoters of Special Orders in all sorts of unreasonable expense. In this case, the objection is merely to the use of certain land, on which the Company desire to erect a gasholder. The Caister Parish Council did not oppose before the Board of Trade; but when the Order was presented to Parliament for confirmation, the local member, at the instance of the Parish Council, opposed. As Parliament was rising next day, the Board of Trade temporarily withdrew the Order. The Company's Parliamentary Agents have submitted a statement to the Board of Trade, showing cause why the Order should go through as presented.

Income-Tax and Special Orders.

It is time the question was definitely settled as to the line of action of local Inspectors of Taxes in regard to the claims of gas undertakings that their costs, or part of them, in obtaining Special Orders should be allowed for the purposes of income-tax. It is understood that the Board of Inland Revenue have issued an instruction that no allowance is to be made in this connection. The view of the gas industry is that this is not right; and therefore the officers of the National Gas Council, in conjunction with their legal advisers, are considering the suitability of the cases before them for supporting the claim of one or more for an allowance being made. The matter cannot remain where it is.

Education and Industry.

The President of the Board of Education and the Minister of Labour have appointed a Committee to inquire into "the public system of education in England and Wales in relation to the requirements of trade and industry." There are seven members of the Committee, one of them being Mr. D. Milne Watson, whose knowledge of what has been done in this matter by the Gas Light and Coke Company and by the gas industry generally should be invaluable to his co-investigators. It is stated that this is the consummation of efforts to bridge the gulf between those who have held that the proper body to deal with the question of juvenile employment is the Ministry of Education, and those who, taking the purely industrial point of view, say it is essentially a matter for the Ministry of Labour. It is also indicated that an important question for the Committee to consider is whether there is not too much bookish learning in elementary schools which ought to be superseded by manual work—in other words, whether schoolmasters have not been too prone to throw all their pupils into the "black-coat brigade" for clerical work in commerce, instead of preparing them for the industries of the country. Against this we would point out that the better our industrial workers are educated, the more impervious they become to the wiles of the Communists, and the more intelligent their interest not only in their work, but in the affairs of every-day life. At the moment, whatever the schoolmasters may do, we see no shortage of industrial workers. The unemployed and dole statistics prove this.

Another German Combine.

The amalgamation of industrial forces is proceeding rapidly in Germany. Last week we noticed the fusion of chemical and aniline dye works; this week the formation of the West German coal and iron trust is an accomplished fact. Its exact name will be the West German Mining and Foundry Company; and the undertakings it includes are the Thyssen, Rheinstahl, Phœnix, Deutsch-Luxemburg, Gelsen Kirchen, and Bochum. There is an obvious confidence in Germany regarding the immediate prospects of business; the only thing which is seriously lacking is capital, and loans are being sought in America. Whether or not there is a shortage of capital, Germany succeeds in booking orders which ought to have been retained in, or obtained by, this country. But the policy of the trade unions here and onerous costs are very successfully combining to place work in continental quarters.

The Coal Commission.

The first public sitting of the Royal Commission on the Coal Industry took place last Thursday. That and the following day were occupied with taking the evidence of Mr. E. A. Gowers, Permanent Under-Secretary of the Mines Department. The Commission have been criticized regarding the time that has elapsed since their appointment before beginning their public sittings, but it seems that it was little good doing so before, because nobody, except the Mines Department, was ready to tender evidence; and there must be some reasonably orderly succession in it. The result is that the Commission have decided not to resume their public sittings before the 27th inst., so that all this week and up to next Tuesday is a blank. An appeal was made by the Chairman (Sir Herbert Samuel) for expedition consistent with thoroughness, particularly in view of the heavy expenditure which would be involved to the taxpayer so long as the Government subsidy continued, and in view of the uncertainty prevailing in the industry itself. At the right time Mr. D. Milne Watson, the President of the National Gas Council, will give evidence on behalf of the gas industry.

Output and Other Points.

From the evidence of Mr. Gowers, the Commissioners learned that, on the basis of the first six months of this year, the output of coal is now only 86 p.ct. of that of 1913. There has been a gradual descent of the output per man-shift. In June, 1914, the output was 21·22 cwt.; in 1922, 18·02 cwt.; in 1923, 17·83 cwt.; in 1924, 17·59 cwt.; and in the first half of this year, 17·92 cwt. Of the total output in 1924, 18·7 p.ct. was cut by machines, compared with 8·5 p.ct. in 1913. On the basis of the first six months of this year, exports are now only 70 p.ct. of those of 1913. In 1913, it cost 8s. 7½d. to produce a ton of coal, of which 6s. 4d. went in wages, and 1s. 10d. in other costs, excluding royalties. To-day it costs 16s. 8¼d to produce a ton of coal, of which wages account for 11s. 10d., and other costs 4s. 4½d. Statistics show that the industry as a whole was working at a loss in the first half of this year; while in 1913 the profit was about 1s. 6d. per ton. The present demand for our coal, and in consequence the output, is down to the level of twenty years ago; and yet the industry is employing a quarter of a million more persons than they were then doing. The Commissioners must already have come to the conclusion that there are three points that particularly require examination—the increased manning of the industry in relation to output, the effect of the reduced man-shift output (3·3 cwt. compared with 1914) upon the fortunes of the industry, and why there is the reduced output despite the increase in the use of machines.

Central Heating and the Cup of Tea.

Central heating is never likely to become the fashion in this country. People do not like it; and we do not blame them. Radiant heat is what is required for maintaining vitality and health. The subject cropped up in the course of a discussion at a conference of the Smoke Abatement League at Buxton. Dr. Bennett, the Medical Officer of Health for the rural area of Warrington, stated that the need which has arisen for typists and clerks to be provided with a cup of tea morning and afternoon in offices where there is central heating is probably caused by the dry atmosphere of the rooms and the absence of ventilation. A feeling of lassitude creeps over people who have to work in such an atmosphere; and they have to restore their vitality by artificial means. Hence the cup of tea.

Gas-Fried Fish in Paris Streets.—We learn from our contemporary the "American Gas Journal" that the Paris Gas Company have recently begun the sale of fried fish and fried potatoes as a practical demonstration of the value of gas for cooking. Each day at noon a bright-painted motor truck equipped with a gas stove and a white-uniformed chef drives up to each of the Company's numerous gas plants, which are scattered through Paris. The gas stove is connected to a main at the gates, and upon it the chef prepares the little fried fish and the crisp potatoes dear to the Parisian. Crowds of working girls and men besiege the new fish-shops daily, according to reports; and the popularity of the gas-cooked luncheon has been so great that many of the Parisian fish-and-potato vendors have already discarded their coal stoves and installed gas-fired equipment, while the demand for domestic gas cookers is increasing steadily.

PERSONAL.

MR. THOMAS GLOVER TO BE LORD MAYOR OF NORWICH.

There will be pleasure throughout the industry at the news that Mr. Thomas Glover has accepted an invitation to fill the responsible position of Lord Mayor of Norwich during the approaching municipal year. It is an event on which both the city and Mr. Glover are to be heartily congratulated.

Mr. Glover is a Chartered Civil Engineer, and was President of the Institution of Gas Engineers in 1908. He has spent all his working days in gas concerns. Born in St. Helen's in 1862, after a technical training he was appointed Assistant Manager of the gas-works in his native town. In 1892 he filled a similar position at the Corporation Gas and Water Works at Carlisle. His first appointment as Manager was at West Bromwich, and in 1901 he went to the Norwich Station of the British Gas Light Company, Ltd., in succession to Mr. John Young. There in the last 24 years he has done much to improve and extend the service. The works have been remodelled, and the distribution system brought up to date; and many new devices have been adopted that add to the comfort and the convenience of gas consumers, of whom there are over 30,000 in Norwich and adjoining districts.

The war brought upon Mr. Glover many new duties and responsibilities. He was given the supervision of a large area; his business being to stimulate the production of bye-products of coal distillation for the use of the Ministry of Munitions and the Ministry of Agriculture. Under his direction, the British Gas Light Company put down plant to enable them to supply the Ministries with benzole and toluole for high power explosives, and with sulphate of ammonia to be used as manure for crops. He represented the gas industry on the Board of the Coal Controller, and held the position of Assistant Controller. This body performed highly important functions during the coal shortage that arose as a consequence of the war; and for his services he was awarded the C.B.E.

Mr. Glover has taken a considerable part in the social and philanthropic life of the city, and has had in this the wholehearted support of his wife. He was Chairman of the Committee of the Y.M.C.A. for many years, and has always taken a keen interest in the welfare of the young men of Norwich. He is a Past-President of the Science Gossip Club and of the Rotary Club, and has delivered numerous lectures of a semi-scientific character. Mr. Glover married the daughter of Mr. Christopher Sharples, of St. Helen's. Of his three children (two sons and a daughter), one son was killed during the war. Between 1914 and 1918 Mrs. Glover did much social work for the benefit of soldiers located in Norwich and the district.

MR. C. F. BOTLEY HONOURED.

A beautifully illuminated address, the work of the Hastings School of Art, was presented to Mr. Charles F. Botley, Engineer and Manager to the Hastings and St. Leonards Gas Company, on Saturday, Oct. 10, by the employees in all departments of the Company's service. The address, which was accompanied by an album containing the names of the subscribers, congratulated Mr. Botley on his election as President of the Institution of Gas Engineers, which, they felt, commemorated his long and distinguished service to the gas industry.

Mr. F. J. Winter, Chief Assistant Engineer, presided, and complimentary speeches were made by Mr. A. Coote, deputy cashier, Mr. H. R. Baker, fitting foreman, and Mr. G. Willett, foreman of the Glyne Gap engineer shop.

Mr. Botley, in acknowledging the gift, said he was deeply touched by the interest they had shown in the honour which had been conferred on him. He said there were responsibilities attached to the position; and, as an example, he mentioned that they were at the present time engaged in drawing-up a case for the gas industry to put before the Coal Commission.

Regret was expressed at the illness of Mrs. Botley, who received a handsome bouquet from the employees.

PRESENTATION TO THE LORD MAYOR OF MANCHESTER.

The Lord Mayor of Manchester (Alderman F. J. West) was the recipient on Friday evening, Oct. 16, of a unique present which took the shape of a silver model of the Manchester Town Hall. The occasion was a complimentary dinner to the Lord Mayor at the Midland Hotel by some of his engineering colleagues, designated for the occasion "West's Associates," who, having been identified in the past with the engineering firm of which he is the head, to-day occupy prominent and responsible positions with gas undertakings or engineering firms connected with the gas industry. Many of those present had received their early engineering training with the firm; and the Chairman of the gathering, Mr. H. Simmonds, now Engineer and General Manager to the Bury Gas Committee, was an articled pupil to the Lord Mayor's father (the late Mr. John West) in the early eighties.

During the evening a number of messages were read from those associated with the presentation, but who were unable to attend. These included cables from Vancouver, Ottawa, Portland (U.S.A.), Pernambuco (Brazil), Christchurch (N.Z.), and Bergen (Norway).

The model, which was made by Messrs. Finnigans, of Manchester, is a fine piece of workmanship, reproducing faithfully the proportions and details of the Town Hall, which is itself an interesting and imposing example of modern Gothic architecture. The inscription reads as follows:

> "Alderman Fred. J. West, J.P., with the esteem and congratulations of 'West's Associates' upon attaining the high office of Lord Mayor of Manchester, Nov. 9, 1924-Nov. 9, 1925."

Round the base of the model thirty-five actual signatures of those connected with the presentation were reproduced.

FORTHCOMING ENGAGEMENTS.

[*Secretaries of Gas and Kindred Organizations are asked to assist in making this diary of events as complete and useful as possible by sending the earliest intimation of all meetings.*]

Oct. 24.—YORKSHIRE JUNIOR GAS ASSOCIATION.—Annual meeting at Leeds University, followed by tea and smoking concert.

Oct. 28.—SOUTHERN ASSOCIATION OF GAS ENGINEERS AND MANAGERS (EASTERN DISTRICT).—Meeting at No. 28, Grosvenor Gardens, S.W. 1, at 2.30.

Oct. 28.—EVENING STAR LODGE.—Meeting.

Oct. 30.—LONDON AND SOUTHERN DISTRICT JUNIOR GAS ASSOCIATION.—Meeting at the Westminster Technical Institute.

Nov. 4.—NORTHERN STAR LODGE.—Commemoration meeting.

Nov. 5.—GAS COMPANIES' PROTECTION ASSOCIATION.—Annual general meeting at Caxton Hall, Westminster, at 3 o'clock.

Nov. 7.—SCOTTISH JUNIOR GAS ASSOCIATION (EASTERN DISTRICT).—Joint meeting with Western District, at Glasgow.

Nov. 10.—CENTRAL EXECUTIVE BOARD OF THE NATIONAL GAS COUNCIL.—Meeting.

Nov. 10.—FEDERATION OF GAS EMPLOYERS.—Meeting.

Nov. 12.—SOCIETY OF BRITISH GAS INDUSTRIES.—Autumn general meeting at the Hotel Cecil, under the presidency of the Rt. Hon. Sir Alfred Mond, Bart., M.P.

Nov. 18.—SOUTHERN ASSOCIATION OF GAS ENGINEERS AND MANAGERS.—Meeting at the Hotel Cecil, Strand, W.C. 2, at 2.15 p.m.

Nov. 25.—EVENING STAR LODGE.—Meeting.

Nov. 26.—MIDLAND ASSOCIATION OF GAS ENGINEERS AND MANAGERS.—Autumn meeting at Birmingham.

Nov. 27.—NORTHERN STAR LODGE.—Regular meeting.

Dec. 5.—SCOTTISH JUNIOR GAS ASSOCIATION (EASTERN DISTRICT).—Visit to the Alloa Gas-Works. Paper by Mr. W. Scott.

INSTITUTION OF GAS ENGINEERS.

Nov. 10.—4 p.m., Advisory Committee on Education.

Nov. 11.—11.30 a.m., Emergency Committee. 12.15 p.m., Benevolent Fund Committee of Management. 12.45 p.m., Finance Committee.

Nov. 25.—11 a.m., Institution's session at the Public Works, Roads, and Transport Congress.

Dec. 2.—Official visit to the Shipping Engineering and Machinery Exhibition at Olympia.

Dec. 8.—4 p.m., Advisory Committee on Education.

Dec. 9.—11.30 a.m., Emergency Committee. 12.30 p.m., Finance Committee.

A CINEMA FILM OF OUTSTANDING MERIT.

Propaganda by means of the motion-picture depends for its success entirely on the human interest that can be infused into the story in which it is enfolded. Judged by this standard, "An Artist's Model," the gas-grate film now appearing all over the country, is sure to make history. When we saw this film, it was received very enthusiastically, and it was apparent that the lesson of the gas fire's usefulness could not have been given in more convincing circumstances.

The story opens with a presentment of a struggling artist, who cannot paint because his studio is so cold, and his coal cellar is empty. The newly-arrived occupant of the studio next door, being approached for the loan of some coals, is discovered as a young girl; and the obvious comfort of her room, in which a Radiation gas grate is burning, leads to explanations, in the course of which the girl unconsciously strikes a pose which appeals to the artist strongly. His subsequent painting from this of the successful picture of the year, his marriage to the "model," and their return home after the honeymoon are amusing episodes in a film that is undoubtedly clever.

Radiation Limited are to be congratulated on their intelligent use of still another powerful medium through which to tell the public of the wonderful advantages of gas for domestic heating.

OBITUARY.

HUBERT DYNES ELLIS.

It is inevitable that the passage of time should bring changes, and that, sooner or later, old friends should part; but the recognition of this is powerless to soften the blow when it falls. Thus it was with feelings of the deepest regret that we learned of the death on Wednesday last of Mr. Hubert Dynes Ellis, who had lived a long life of 84 years, during which he had gained the respect and admiration of all who enjoyed the privilege of becoming acquainted with his upright character and his scholarly attainments. His passing leaves all who knew him to deplore the loss of one who, sound in principle, courteous in manner, and gentle in speech, was a typical example of the English gentleman. Always active, both mentally and bodily, the passage of time appeared to affect him but little, until he suffered the loss of his wife in January, 1924, since when his health failed sadly. His death on the night of Wednesday last at No. 10, Roland Gardens, S.W., was the culmination of a fortnight's severe illness, during which he never regained consciousness.

Born in 1840, our friend was the third son of Mr. Robert Ellis, a well-known Solicitor in the City of London. After receiving his education at Rugby, he went out to Persia, and on returning to this country entered Doctors' Commons, under the late Mr. Rothery, and there laid the foundation of his sound legal knowledge. Later he became Secretary to the Honourable Artillery Company, but left them in the year 1879 to become (on the death of Mr. E. J. Southwell) Secretary to the Commercial Gas Company. He commenced his duties on Jan. 1, 1880; and the position he held for the long period of 31 years until April 30, 1911, when he resigned. It was in this connection that he was best known to "JOURNAL" readers. On relinquishing office, he was unanimously elected a member of the Board of Directors, and so remained until his death. During his Secretaryship of the Commercial Company, Mr. Ellis was associated with three generations of Engineers—Mr. Robert Jones, Mr. Henry E. Jones, and Mr. Stanley Jones—and we believe it is correct to say that throughout these 31 years he was never absent a single day on account of ill-health. He was succeeded by Mr. F. J. Bradfield, the present General Manager and Secretary, who was at that time the Accountant of the Company. Regarding his old friend, Mr. Bradfield says: "Mr. Ellis's tact, courtesy, and charm of manner endeared him to the staff of the Company and also to his colleagues on the Board, and his loss will be deeply felt by all associated with him."

The deceased found additional scope for his abilities and his remarkable activity outside the Commercial Gas Company. For the long period of 32 years, Mr. Ellis was associated with the Oriental Gas Company, Ltd., as Director and Chairman, having been elected to the Board in March, 1893, and appointed Chairman in July, 1910, on the retirement of Mr. Robert Hesketh Jones, the then Chairman.

During his directorship Mr. Ellis at all times showed a very keen interest in the working and operations of the Company; and, by his ever courteous and kindly manner, endeared himself to his colleagues on the Board, and to all members of the staff with whom he came in contact. As Chairman, his businesslike conduct of the proceedings at the annual general meetings always elicited appreciative thanks from the proprietors. His wise counsel and kindly presence will be sorely missed alike by his colleagues on the Board, by the proprietors in general meeting, and by the Company's officials and staff. It was in June, 1916, that Mr. Ellis was appointed a member of the Board of the Tottenham District Light, Heat, and Power Company, at the time when the late Right Hon. Sir Daniel Ford Goddard succeeded Sir Corbet Woodall as Chairman. He held an interest, too, in a number of other gas undertakings. In August, 1890, he was elected Auditor of the London and Blackwall Railway Company, of which he subsequently became Deputy-Chairman. Apart from his professional work, he rendered, as a member of the Royal Borough of Kensington, service in the management of the municipal affairs of the district in which he resided; and he found time to perform the duties devolving upon a Justice of the Peace.

Glancing back through the volumes of the "JOURNAL," one is reminded of the fact that on various occasions, through the medium of its pages, useful information has been imparted to the gas industry in letters and articles bearing his signature; the matters dealt with being naturally of more special interest to the administrative branch of the industry. But we particularly wish to take this opportunity of making acknowledgment of the fact that for a period certainly not less than thirty years Mr. Ellis was responsible for our weekly Stock and Share Market report; and over the whole of this time, so punctilious was he in his affairs, that we cannot recall an issue in which he missed making his customary contribution.

Besides the many activities of which mention has already been made, Mr. Ellis was a man of many interests. He was well known as a collector and sound judge of old silver, of which he had at one time a large collection. This he often lent to museums for exhibition. In another direction, he had a reputation among scholars for his Latin and English verse. He lived through a changing age, as is shown by his having made a voyage in a fighting three-decker under sail, and by his having been presented in his youth to the great Duke of Wellington.

We are pleased to think that the family is still represented in the gas industry, for his son, Mr. Bertram W. Ellis, is a Director of the Oriental Gas Company.

The funeral was of a strictly private character.

ELECTRICITY SUPPLY MEMORANDA.

THE trade unions of this country do not consider the full effects of their policy in relation to high wages, short hours, and low production per man per working day. Where the policy applies in any or all of these respects, naturally it influences the price at which the goods can be sold; and one consequence is that, with international competition, we have the spectacle of much work flowing to Continental countries where production is less costly, and therefore the charge to the buyer is on a lower scale. In other words, the policy of the trade unions drives work abroad, causes more unemployment in this country, which raises the rates to be paid by industry, and so reduces its commercial power. The vicious circle is maintained, and there is no breaking it down—simply because common sense does not prevail. There is nothing like it in America, where high wages obtain, but good output is given in exchange, and the workers are not so foolish as to refuse to operate with the masters in making the industrial position secure. In Germany wages may not be so high as here, but there is nothing like the unemployment there that exists here, owing to production being on the high scale, whence the ability of the employers to compete, and easily beat Great Britain, in securing markets. The trade unions here will not recognize these things. The leaders prefer to babble about not giving up that which has been gained, while losing industrial occupation for their members. Several contracts for electrical plant have gone to Germany from this country, in the same way that much work which should have kept our shipyards better employed has gone to the Continent, and just as much of our overseas coal trade has been captured by the Continent and America. A small illustration of what is happening will suffice. Among the contracts won by Germany is one for £4000 worth of cable for Ilford—the tender of the Deutsche Kabelwerke being 13 p.ct. lower than the British tenders. One reason for this difference is that the trade union rates of wages are at present something like 40 p.ct. higher than those paid in Germany. When the Ilford Council asked for tenders for the cable, they inserted the usual clause insisting on adherence to trade union rates of wages and working hours. This referred to British trade union rates of wages and hours, and it would be interesting to know how the Ilford Council can reconcile that clause with the acceptance of a tender in relation to which British trade union conditions do not apply. But the point is that the trade unions in this country are doing more than anyone else to provide the Continent with work, and to rob their own members of employment. The limits of the vision of the leaders of the unions are painfully circumscribed.

The Vicious Circle.

Various sections of the electricity industry appear to be tripping over each other in propaganda work. The Electric Lamp Makers' Association are indulging in a large amount of publicity, and have got out some excellent artistic designs in show cards. They are also tendering much information to retailers and contractors as to the way they should go and what they should do—particularly in connection with shop lighting. The Electrical Development Association have also started their autumn advertising campaign; and their announcements are appearing in a selected number of provincial papers as well as in the London ones. The Association are advising retailers and others to have special displays and demonstrations of modern lighting, colour-sprayed lamps, &c., fittings, glassware, wiring systems, switch controls, heating, &c. It is hinted that the Association have further developments in hand, so they may spring surprises on us. The Women's Electrical Association are busy lecturing about the country at local exhibitions. The Electric Lamp Makers' Association are at the end of this month holding their seventh "school" course, which is designed to instruct contractors and retailers in the fundamentals of good illumination. The course only lasts four days; but in that time the student is taken from the making of an electric glow lamp to the latest devices in the art of illumination. The Association has for demonstration purposes a shop interior; and the lectures and demonstrations are held in connection with this. By its aid indifferent and good lighting are shown; and it illustrates how by old types of fittings and lamps giving place to new, large improvements can be effected in the illumination of shops, and

Activity.

yet produce economy. Of course, that follows with other systems of lighting; but direct comparative demonstration goes a long way to produce conviction. We suggest that by a clockwork system demonstrations of a similar kind could be made in gas showroom windows. This would be a good attraction during the dark evenings.

Industrial Charges.

Our political friends who think that the dearness of electricity is a prominent cause of industrial depression and of unemployment in this country would obtain enlightenment to the contrary if they studied the electrical papers. On Oct. 7 (p. 29), we quoted from an electrical source something to the same effect as has been stated in the "JOURNAL" time and again since the Reconstruction Committees were set up, and produced a vast amount of fiction. That "something" was the well-established fact that power in the total of works costs per unit of production is a mere fraction. Now we are having industries telling the Government pretty plainly that one of their main troubles is not power, but the grievous burden of local rates and imperial taxes. The industries are not prepared to have facts veiled by the threadbare cheaper power propositions of the Government, who in this regard do not know what they are talking about, but perforce have to cling hold of something that appeals to the popular imagination and appears to be constructive. But industry knows better; so do our electrical contemporaries. An article in the "Electrical Times" bemoans the fact that the industrial electric heating idea has not yet caught on in this country; and it is admitted that the electrical industry itself has not yet complete confidence in electricity for such purpose. It is pointed out that on the other side of the Atlantic the view is held that in time the industrial electric heating load will be of greater importance than lighting, and will equal, or exceed, the present motor load. The view that energy is supplied in America at lower rates than in this country is not supported by facts. On this matter, the writer says: "A recent comprehensive survey by one large central station disclosed the fact that whereas its motor load produced a revenue of $28 per KW.-year, industrial heating produced $40 per KW.-year—nearly half as much again. Generally speaking, electricity is sold in this country quite as cheaply, or cheaper, than in America. Since then industrialists there find it is worth while to employ electricity for heating when paying nearly 50 p.ct. more per KW.-year than for energy for power purposes—and no one, presumably, will accuse them of philanthropic motives—existing rates in this country cannot logically be the obstacle to industrial electric heating expansion."

The Road Fund.

If any hopes were raised in the electricity industry by the Chancellor of the Exchequer that some cheap money would be made available for its development by diverting for a long period money raised by the taxation of motorists, and which constitutes the Road Fund, we fancy those hopes are doomed to disappointment. Motorists are resolved that the promise attached by the Treasury originators to the raising of the fund—that it should only be utilized for road purposes—shall be duly honoured. Motorists are strong in the land to-day; and ever needy Chancellors of the Exchequer have to study their views when their interests are directly assailed. Occasionally one hears grumbles over this special tax; but they are not very loud or prolonged. But the motorists want to see the money they contribute spent on new roads, and on the improvement and maintenance of existing roads; and there is no end to the classified roads which motorists are of opinion should receive more attention than they do. There is also the level-crossing problem. The motorist does not want to loiter about waiting for trains to pass. He would prefer all such crossings to have above them the means for carrying him over without having to interrupt his journey. Since the inventive Mr. Churchill set his eyes on the Road Fund for electricity development, the motoring community has discovered a vast amount of work that requires to be done in connection with roads, and to which the money they contribute can be legitimately applied. Recently, the Home Secretary (Sir William Joynson-Hicks) referred to the fund in a speech to the automobile industry; and this has revived the controversy as to the best and most appropriate manner in which the money can be employed. Commander F. P. Armstrong, the Secretary of the Royal Automobile Club, says the suggestion of the Chancellor of the Exchequer that a portion of the fund shall be devoted to other purposes than road construction and maintenance is being vigorously opposed by the Club and other motor organizations. The Government will think well over this opposition before attempting to "raise the wind" for the electricity industry in the grotesque manner proposed.

Yorkshire Junior Gas Association.—Following the business meeting of this Association, on Saturday next, at the University of Leeds, Dr. E. W. Smith, of London, will address the members on the subject of "Coke for Domestic Purposes."

INSTITUTION OF CHEMICAL ENGINEERS.

"Transactions" for 1924.

The Second Annual Volume of the "Transactions" of this Institution contains a vast amount of technical matter dealing with problems confronting the chemical engineer, and also much of general interest to all who style themselves engineers. The review of the work done by the Education Committee of the Institution falls into the latter category. The problem of training an engineer has no cut-and-dried solution. Some would have it that a workshop course on leaving school might unsettle a boy and make him disinclined to return to a scholastic life, and that he would also reap greater benefit from practical work after he had completed his theoretical studies. Others hold the view that a boy on leaving school would more readily adapt himself to the life, routine, and discipline of the shop, and would receive more assistance from foremen and workmen than one who had acquired independence as the result of time passed at college, and who would be anxious to start on his career. They also consider that workshop experience is a material aid to the understanding of subsequent theoretical work. These, and other, aspects of the important question of education were discussed by, among others, Prof. Smithells and Dr. Travers at the second annual corporate meeting of the Institution; and the report of this discussion in the "Transactions" which we have before us makes very good reading.

THE CHEMICAL ENGINEER.

A chemical engineer is defined by the Institution as a "professional man experienced in the design, construction, and operation of plant and works in which matter undergoes a change of state and composition." It follows, therefore, that a gas engineer is very definitely a chemical engineer. On this interesting statement much could be written; but it would be away from the subject of this brief article. The scheme of education suggested by the Institution of Chemical Engineers, and outlined in the "Transactions," is ambitious, but sound. The trouble with all these things, of course, lies not in training the right men, but in finding the right men to train. The Institution say that, in view of the eventual qualifications required, the technical instruction of the student should be based on general scientific training. The teaching of dead languages in the public and secondary schools, which will be of value as a mental discipline and as an aid to the understanding of modern languages in general, should not be required to continue beyond the Matriculation stage. Beyond this stage, it is suggested, the requirements of a general education should be satisfied by the inclusion of two modern languages and the study of English subjects and elementary economics; while mathematics, including the calculus, and mechanics, chemistry, physics, and physical chemistry should be studied as sciences—distinguished, that is, from their teaching as part of a liberal education. This would bring the student to about eighteen years of age.

At this period of his training, two courses are open to him. He should either spend a year or a year-and-a-half at an engineering works, and then proceed to a university or a technical college; or he should go direct from school to a university, and acquire workshop training after obtaining his degree. In the latter case, attendance at a works should be arranged for during the long vacation, and one long vacation would with advantage be spent abroad in either case, with the double object of obtaining fluency in conversation in a modern language, and of broadening the mind.

AND THE GAS ENGINEER.

We say with conviction that all this—subject, of course, to modification—applies to the training of the gas engineer. Mr. H. D. Madden, of Cardiff, in his Presidential Address before the Wales and Monmouthshire District Institution of Gas Engineers and Managers, showed his realization of this when he said that "one would like to see the public school men more and more attracted to our service." All will agree with Mr. Madden's view that, to provide for the future personnel of our industry, it is vital that technical education should be developed.

In addition to an interesting address by Sir Arthur Duckham, the President of the Institution, the "Transactions" include reports of a general character, and the following papers: "The Transport, Storage, and Distribution of Hydrochloric Acid," by D. M. Newitt; "Self-Balancing Centrifugals," by E. A. Alliott; "Evaporation in Currents of Air," by J. W. Hinckley and G. W. Himus; "A Critical Study of the Published Results of Tests of Water Gas Plants," by M. W. Travers (given in Vol. 168 of the "JOURNAL"); "The Effect of Acids on the Mechanical Strength of Timber," by E. A. Alliott; "Heat Transfer," by M. B. Donald; and a Bibliography on Drying Machinery, also by A. E. Alliott.

The volume is exceedingly well printed, and contains many illustrations and diagrams.

NATIONAL GAS COUNCIL.

Meeting of the Central Executive Board.

The Central Executive Board of the National Gas Council met on the 13th inst. at No. 28, Grosvenor Gardens, S.W.—Mr. D. MILNE WATSON in the chair.

ELECTRICITY.

It was reported that it appeared from announcements in the Press that the recommendations of the Cabinet Committee with regard to electrification schemes would be embodied in a Bill to be introduced next session.

WORLD POWER CONFERENCE.

It was reported that it appeared from announcements in the Press that steps were being taken to hold a sectional meeting of this conference in Basle next year, and that a full conference was being arranged for 1930. The officers were instructed to get in touch with the Secretary of the conference in connection therewith.

ROYAL COMMISSION ON COAL INDUSTRY.

It was reported that the Royal Commission on the Coal Industry were holding their first sitting on the 15th, and that the proceedings would be public, and would take place in a room in the House of Lords. Mr. D. Milne Watson (President of the Council) was authorized to give evidence on behalf of the National Gas Council.

TAR.

A report was submitted with regard to the various tar schemes now in existence throughout the country, but a discussion of this report was deferred until the next meeting of the Board.

The work undertaken by the Joint Committee with the National Coke and Bye-Product Plant Owners was outlined, and the Committee were thanked for the steps they had taken.

RATING AND VALUATION BILL.

It was reported that the Federation of British Industries had suggested that their members should urge their respective Members of Parliament to support the clauses in the above Bill exempting certain machinery from rating. The Central Executive Board, however, did not agree to adopt this suggestion.

FEDERATION OF BRITISH INDUSTRIES—GRAND COUNCIL.

The following were re-appointed to represent the Council upon Main Group 14 (Public Utility), Sub-Group 3 of the Grand Council of the Federation of British Industries: Mr. F. W. Goodenough, Mr. A. A. Johnston, and Mr. A. Caddick. Main Group 9, Section 1 (Chemical Fertilizers and Explosives): Mr. A. A. Johnston. Mr. C. F. Botley was also appointed to this Group, *vice* Mr. Stanley Jones (retired).

DECIMALIZATION OF COINAGE.

The Board, by resolution, recommended that the proposal by the Executive Committee of the Federation of British Industries that the token value of the penny should be increased by 20 p.ct. should be rejected, and the officers were instructed to inform the Federation to this effect.

SPECIAL ORDER UNDER SECTION 10—GREAT YARMOUTH GAS COMPANY.

It was reported that when this Order was presented to Parliament for confirmation in August last, the local Member of Parliament, at the instance of the Caister Parish Council, opposed the Order so far as section 7 was concerned, which authorizes the use of certain land for the erection of a gas-holder; the Parish Council pressing for an alternative site to be selected. The Board therefore withdrew the Order, as Parliament was rising on the following day. The Board of Trade have asked the Yarmouth Gas Company for a statement in support of their contention that the Order should go through as presented; and this has been prepared. The Company point out that this case raises an important question for the gas industry, as there was ample opportunity for objections to be raised at the Board of Trade inquiry before the Order was presented to Parliament, but the Caister Parish Council did not avail themselves of this opportunity. The Parliamentary Agents for the Company (Messrs. Sherwood & Co.), it was said, were presenting a statement to the Board of Trade; and the Council agreed to support such statement.

INCOME-TAX IN CONNECTION WITH SPECIAL ORDERS.

It was reported that difficulty was being experienced by certain gas companies with their local Inspectors of Taxes in obtaining part of the cost of the Special Orders allowed for income-tax purposes; and it was understood that the Board of Inland Revenue were now issuing an instruction that no allowance whatever was to be made in this connection. It was decided that the officers should, in conjunction with their legal advisers, consider the Special Orders in question; and, if it were found that such cases were suitable, support the companies in question, or one of them, in their claim that the costs, or part of the costs, of such Special Orders should be allowed for income-tax purposes.

CHEMICAL REGULATIONS, 1922.

It was reported that the position with regard to these regulations was still very unsatisfactory, as the Home Office would not grant any certificates of exemption. A case was reported of a very unreasonable demand on behalf of the Factory Inspector, as the facilities only applied to one man; and it was suggested that the opinion of Counsel might be taken at this juncture as to how far the gas company in question, and others were in a position to refuse to comply with the regulations.

INSTITUTION OF GAS ENGINEERS.

Council Meeting.

A Meeting of the Council was held at No. 28, Grosvenor Gardens, on Wednesday, Oct. 14—Mr. CHARLES F. BOTLEY, the President, in the chair.

There were also present Mr. H. D. Madden (Junior Vice-President), Messrs. J. M. Campbell, John W. McLusky, Hubert Pooley, C. S. Shapley, C. Dru Drury, D. H. Helps, John Terrace, G. Rhodes Armitage, Harold E. Copp (Ordinary Members of Council); Mr. Fred A. West (Eastern Counties Association); Mr. W. E. Caton (Midland Association); Mr. John Wilson (North British Association); and Mr. W. E. Price, Hon. Secretary.

The deaths of Prof. Dr. Hans Bunte and Capt. M. H. P. Riall Sankey, C.B. (Honorary Members), and of Mr. H. Blakey and Mr. Henry Peaty (Members) were announced. The sympathy of the Council was suitably expressed.

It was resolved that the congratulations of the Institution be offered to Mr. Thomas Glover, C.B.E., Past-President of the Institution, on becoming Lord Mayor Designate of Norwich.

The following names were approved for the next ballot list: As candidates for the class of Member: Messrs. Charles G. Barrett, of West Hartlepool; Thomas V. Blake, of Cardiff (Institution's Diplomé in Gas Engineering); Thomas Dyson, of Longwood (Institution's Diplomé in Gas Engineering); Jesse O. Halliwell, of Mullingar; Percy H. Hornby, of Brentford; Leonard Lacey, B.Sc. (Eng.), of Stratford; Joseph A. Rooney, of Newbridge, Co. Kildare; and Vernon Simmonds, of East Greenwich.

For the class of Associate Member: Messrs. Henry C. Dunbar, of Hemel Hempstead; John Kirkhope, of Tottenham; Harry J. Risby, of East Greenwich; Robert Shadbolt, of Ascot; and Leonard J. Weaver, of Dover.

Mr. F. H. Arnold, of Guernsey, and Mr. Fred Bedford, of Singapore, were transferred from the class of Associate Member to that of Member; and Mr. Jackson Summerson, of Luton, was admitted as a student.

Mr. George Evetts was awarded the H. E. Jones London Medal for his paper on "The Economics of Gas Production on the Thermal Basis" which he read before the Institution last June.

It was reported that Mr. John Wilson, of Motherwell and Wishaw, had been elected District Member of Council for the year 1925-26 to represent the North British Association of Gas Managers; and that Mr. W. H. Johns, of Swansea, had been elected District Member of Council for the year 1926-27 to represent the Wales and Monmouthshire District Institution of Gas Engineers and Managers.

The Council had the pleasure of receiving from the Irish Association of Gas Managers application for the resumption of affiliation with the Institution, with Mr. J. O. Halliwell, of Mullingar, as District Member of Council.

Mr. W. H. Bennett, of Redhill, and Mr. L. J. Langford, of Tunbridge Wells, as members of the Institution's Finance Committee, were appointed to serve on the Committee of Management of the Benevolent Fund.

The Organizing Secretary's report on the work of the Advisory Committee on Education for last quarter was presented and discussed. The Council's appreciation was expressed.

It was agreed, on the recommendation of the Examiners, that the thesis on "Coal Gas Condensation" which Mr. T. H. Prater, of Tottenham, had written in connection with the Diploma Examination in Gas Engineering, be published in the Transactions.

Mr. John W. McLusky of Glasgow, delegate of the Institution at the Annual Congress of the Royal Sanitary Institute held at Edinburgh, presented his report, which was discussed.

The resignation of Mr. Walter Chaney, one of the four representatives of the Institution on the Heat Engine and Boiler Trials Tabulation Committee of the Institution of Civil Engineers, was accepted with regret, and Mr. C. Rhodes Armitage was appointed as his successor.

A brief report describing the progress of the work of the Committee was submitted.

In connection with the programme of the Public Works, Roads, and Transport Congress to be held at the Royal Agricultural Hall, London, in November, it was announced that the Institution had arranged for a paper to be presented on "The Use of Tar in the Construction of Roadways," by Mr. Thomas Glover, C.B.E., and Mr. Arthur E. Collins.

The President made a statement with reference to the colla-

tion of information for use in the preparation of evidence for laying before the Royal Commission on the Coal Mining Industry.

Arrangements made by the Gas Investigation Committee for carrying-out some tests on the Corbet-Woodall Experimental Gas Plant at Leeds University were reported and approved.

In a communication from the Refractory Materials Joint Committee the proposed arrangements with the Department of Scientific and Industrial Research for continuing the work of the British Refractories Research Association were referred to, and approved.

Further consideration was given to the programme of the Institution's annual meeting next year, and various matters in connection with it were discussed and agreed.

The appeal issued by the University of Leeds in the case of members of the gas industry for the support of the Extension Scheme of the University, was favourably considered, and deferred for discussion.

NOTTINGHAM CORPORATION EXHIBITION.

Lord Mayor of Manchester's Visit.

It was in fitting sequence to the recent celebration of the jubilee of the acquisition by the Nottingham municipal authorities of the city gas undertaking, which has proved a continous source of substantial revenue, that the responsible Committee of the Corporation, of which Alderman Sir Albert Ball is Chairman, arranged for the holding of an exhibition of appliances, which was opened on Tuesday, Oct. 13, at the Empress Rink, and is to be continued until the 24th inst. The inaugural ceremony was performed by the Lord Mayor of Manchester, Alderman Fred West, J.P., whose presence recalled the important contract carried out by his firm for the gas undertaking, including the installation of the Glover-West vertical retorts at the Radford station. The exhibition, as affording practical illustration of the advantages of the use of gas, admirably fulfilled the object for which it was undertaken. One of the principal stands was that devoted to the Committee's own exhibit. Firms participating in the display included Messrs. John Wright & Co., the Davis Gas Stove Company, Messrs. Fletcher, Russell, & Co., the Richmond Gas Stove and Meter Company, Messrs. Wilsons & Mathiesons, Ltd., Messrs. R. & A. Main, Ltd., and General Gas Appliances, Ltd. Among the exhibits were to be seen the Radiation "New World" cookers, a representative series of Richmond's popular "Bungalow" cookers, Wright's "New Eureka" single-bar cookers and "St. Andrew" radiators, Fletcher's "Kingsway" cookers, the Davis "Alpine" cooker series and their "New Shamrock" geysers, with the new "Nautilus" coke boiler. Radiation "Injector-Ventilator" gas grates by all these firms made a pleasing exhibit, one of Wright's "Kenilworth" fires in art silver being shown in a mantel, a fine series of Richmond's "Period" and "Standard" gas grates in various finishes, and Wilsons' "Sunbeam" gas fire. Messrs. R. & A. Main's exhibit included all their well-known modern productions, among which is the "Conservor" oven, concerning which a special article appeared in the "Journal" for Oct. 7, p. 30. The exhibition lacked nothing upon the score of variety or technical value.

The inaugural proceedings were preceded by a luncheon given by the Gas Committee at the Exchange Hall, under the presidency of Sir Albert Ball. In the absence of the Mayor, the toast of "The Nottingham Corporation Gas Exhibition" was proposed by

The Sheriff (Mr. R. A. Young), who referred to recent breakdowns of the electricity supply, following upon the opening of the new super-power station. Rudyard Kipling, remarked Mr. Young, once produced a work entitled "The Light that Failed." This, however, could not possibly apply to the Nottingham Gas Committee. At the same time, he suggested that there was ample room for both gas and electricity services in a city like Nottingham.

Mr. H. M. Thornton, J. P., of London, whose name, with that of Mr. J. A. Maclay, of Falkirk, was coupled with the toast, alluded to the interesting circumstance that 32 years previously he took part in an exhibition in Nottingham, which, though not so important as the one inaugurated that day, marked the beginning of better things in relation to the gas industry. The present display would bring home to the public how extraordinary had been the development of gas, and how, both for cooking and heating, they had stoves which were scientifically correct. They had come to a stage in the history of gas heating and cooking when gas apparatus could be offered to the public with perfect confidence in its success. Nottingham stood high in regard to the success of its gas undertaking, of which Sir Albert Ball had been Chairman for over twenty years. It had provided substantial profits, and that was a good thing for the city. He concluded by sincerely congratulating Mr. Wilkinson on the excellent arrangements made for the exhibition.

Mr. J. A. Maclay, who also responded, urged that gas was doing much to alleviate the smoke nuisance; while in regard to labour-saving appliances notable advances had been made in the industry.

Sir Albert Ball, proposing the toast of "The Visitors," upon whose behalf the Lord Mayor of Manchester and Mr. J. Ferguson Bell responded, observed that Alderman Fred West's father was one of the pioneers of the gas industry, and one of the most capable men it had ever known. West's Gas Improvement Company had done work for the Nottingham Corporation almost since its inception. They hoped that the gas undertaking would go hand-in-hand with that responsible for the supply of electricity, believing that there was room for them both.

The Lord Mayor of Manchester, in reply, expressed his acknowledgment of the compliment which had been paid to that city that he should be invited to come to Nottingham for the purpose of opening the exhibition. He was especially gratified that Sir Albert Ball should have referred to his (Alderman West's) father as having been one of the stalwarts of the industry.

Mr. J. Ferguson Bell expressed his gratification at knowing that two important branches of the Nottingham Corporation service were working together in harmony, because he believed there was ample room for both. The municipal authorities were fortunate in having such an eminent Engineer as Mr. John Wilkinson.

The Sheriff proposed the toast of "The Chairman."

Sir Albert Ball, in response, said that he had always been splendidly supported by members of the Gas Committee. They had striven as far as possible to make the best of the Nottingham undertaking, and they had been ably assisted by a remarkably good Engineer. They had been fortunate also in having an admirable accountant in the late Mr. Garton, who was a wonderful man in his generation, and they had been equally fortunate in securing an excellent successor in the present occupant of the position, Mr. R. H. Mason. Whatever might happen, he could assure them that it would be many years before it would be necessary to buy a wreath for the funeral of the gas undertaking. There was a great future for gas, as there was for electricity; and he believed that both would prove of inestimable benefit for generations to come.

Subsequently the opening of the exhibition at the Empress Rink was performed.

The Lord Mayor of Manchester congratulated the Gas Committee upon the way in which they were seeking to educate the citizens of Nottingham in regard to one of the most valuable and important public utility services. Such an exhibition as that which had been opened that day could not fail to be of educational worth. The gas industry had been such a faithful servant of the public that people were inclined to under-estimate its usefulness and the important part which it played in the life of communities. Its magnitude was shown by the Board of Trade returns, which revealed that in 1924 no less than 257 million c.ft. of gas was sold in the United Kingdom to nine million customers; 18 million tons of coal being carbonized in the process of production. In the last ten years, despite acute industrial depression, there had been an increase of 10 p.ct. in the amount of gas consumed. The output of gas increased by 70 p.ct. between 1902 and 1923. In the latter year the capital invested was £165,000,000, of which the municipalities possessed £58,000,000. Municipal gas undertakings could reasonably claim to be the most successful of all municipally-owned public services, and gas stock was still among gilt-edged securities. The Nottingham gas undertaking reflected progress to a marked degree, suggesting that a courageous, progressive policy had been followed throughout. All the figures demonstrated that gas was by no means a dying industry. His prediction was that it would not only survive, but that it would expand, because gas still afforded the most efficient method of supplying the heat latent in coal. It held the solution of many of the problems upon which the prosperity of the country would depend more and more. He protested against the subsidizing of electricity undertakings, declaring that he was no believer in the subsidizing of any industry.

It was evidence of considerable interest in relation to the exhibition that no fewer than 224 entries had been received for the schoolgirls' cookery competitions.

Lectures and demonstrations in cookery by Miss Lina Parkyn, Diplomée of the National Training School of Cookery, and lecturer at Wembley Exhibition, proved a great attraction.

On Saturday last members of the Midlands Circle of Gas Salesmen were entertained at tea by the Gas Committee at the Mechanics' Institute, after having inspected the exhibition. A cordial welcome was accorded to the company by Sir Albert Ball, who spoke of the importance of the salesman's work. The future of the gas industry depended largely upon the young men and women concerned in it.

Mr. G. M. Lewis, Chairman of the Midlands Circle, expressed his belief that the gas industry was on the edge of a boom such as had not been experienced since the early days of the prepayment meter.

Other speakers referred in appreciative terms to the many attractive features of the exhibition.

New Bomb Calorimeter.

In the October issue of "Fuel in Science and Practice" mention is made of a new type of bomb calorimeter which has been devised by Husen and von Wartenburg for rapid work with small quantities of fuel (0·05 to 0·10 gramme). Essentially it consists of a large glass thermometer containing toluene, which also acts as the calorimetric liquid. The "bomb," a piece of thin-walled stainless steel tubing 25 mm. in diameter, is placed inside the thermometer bulb, which is lagged with felt. The bomb contains compressed oxygen, in which the coal is ignited electrically, and burnt in the usual manner. The rise of the toluene in the stem of the thermometer is noted. The instrument is calibrated empirically by the combustion in it of definite weights of benzoic acid, the calorific value of which is known. Thus the reading gives directly the amount of heat evolved. An accuracy of ± 1 p.ct. is claimed for the instrument, and a saving of three-quarters of the time taken by a determination in the usual type of bomb calorimeter. Presumably there is also a considerable saving in expense.

NORTH OF ENGLAND GAS MANAGERS' ASSOCIATION.

THE autumn meeting of the North of England Gas Managers' Association was held at Stockton-on-Tees last Friday under the presidency of Mr. W. W. ATLEY. There were about 100 members present, who prior to the meeting paid a visit of inspection to the Corporation Gas-Works, over which they were conducted by Mr, Atley and his Assistant Manager (Mr. F. Scaife).

A CIVIC WELCOME.

A civic welcome was extended by the Mayor (Mr. L. Ropner, J.P.) to the members attending. He said it was a particular pleasure on that occasion, because they had as their President Mr. Atley—a gentleman whom they all honoured. They had had on their minds in that district, he continued, a very important centenary. The past year, however, had witnessed the centenary not only of railways, but of other important mechanical and chemical developments, which had meant a great deal to the world. It was wonderful to think that only a hundred years ago they were dependent upon the candle as the best form of lighting. There were then many forms of lamps, it was true, dating back thousands of years, but the candle was what they depended upon at that time, when gas was first introduced; and Stockton was one of the earliest towns to adopt it. Gas had had its life, and would continue to have its life, although there were a number of people who were trying to persuade the public that its day was over. He was convinced absolutely that this was not the case. It had a great competitor in electricity; but it was perfectly certain the two would work together, and one would be the complement of the other. They could no more do without gas nowadays than they could without electricity. They were rather liable to look upon gas from a local point of view, and to think that it was having a bad time just now because it was not making money. Well, that was not the fault of that particular place, or indeed any place. It was the fault of the state of industry in the country and, in fact, all over the world. Gas-works were very dependent upon their bye-products and the facilities for disposing of them. If the coal industry was at a low ebb, as it was at present, and coke was difficult to dispose of, then the gas industry suffered accordingly. Gas had many values, not only for lighting but heating, and it was a clean and cheap form of heating. It was well recognized that the developments in the latter direction were nothing like complete; and he knew that the experts such as those he saw around him were giving close and earnest attention to these problems. There was a good deal more to be done in the next ten years than the lay mind knew of, but of which they who were studying the questions were aware, particularly in the case of heating. There was a great deal of talk nowadays in and out of Parliament about low-temperature distillation. He could not attempt to say much about that as a layman, but it did seem to him that there were two schools of thought on this subject. One wished to retain in the gas the greatest heating and lighting values. Well that was a system of juggling which a layman like himself did not understand, but he believed it was the best policy to take out a valuable property and substitute a cheap one if this could be done without injuring the original in any way. The second school were claiming to take everything possible out of the coal and still leave a fuel which would be useful for household purposes. It would be foolish of him to try to develop this theme in front of an audience so steeped in the subject as they were, and he would conclude by again welcoming the Association on behalf of the Council, and expressing the hope that they would derive much benefit from their deliberations.

Councillor T. WILKINSON (Deputy Chairman of the Gas Committee) apologized for the absence of the Chairman (Alderman McNaughton), who was indisposed, and expressed his pleasure at being able to be present and support the civic welcome extended by the Mayor to the members of the Association, not merely because of their formal visit to Stockton but because of his friendship with Mr. Atley, for whom he had a great admiration. Mr. Atley was held in the highest esteem by the Gas Committee, and he himself often thought he was perhaps too guileless, if that could be possible. During the short time he (the speaker) had been associated with the gas undertaking of Stockton, he had had some interesting experiences, not the least of which was his opposition at one time to a scheme for the installation of vertical retorts as against horizontals. He remembered clearly at a Local Government Board inquiry venturing to give evidence against horizontal retorts, and there was still impressed upon him the fact that the Inspector took very little notice of him. [Laughter.] Although he was turned down at the inquiry and at the Stockton Town Council meeting, he eventually won his point. As others who knew the value of gas, he did not belittle its importance, and with the Mayor he believed there was still a great future before the gas industry.

NEW MEMBERS AND PRESENTATION OF CERTIFICATES.

The PRESIDENT then took the chair, and Mr. W. Bett (Newcastle) was transferred to full membership and Mr. J. H. Curry (Newcastle) was elected a member. The following were elected associates: Messrs. J. Corrigan (Penrith), R. M. Hill (Newcastle), J. C. Wood (Sunderland), W. Stephenson (South Bank), T. F. Brown, and W. A. Walmsley (Blaydon).

Mr. H. Greig (Sunderland) and Mr. W. Stephenson (South Bank) were presented with certificates obtained in the recent examinations under the Education Scheme of the Institution of Gas Engineers.

Mr. W. W. Atley, Engineer and Manager of the Stockton-on-Tees Corporation Gas Department, then proceeded to deliver his

PRESIDENTIAL ADDRESS.

[Mr. W. W. Atley explains in detail how, under adverse conditions, a setting of horizontals at the Stockton Corporation Gas-Works was demolished, and how eight beds of horizontal retorts were built to replace it, during the short period from April 25 to Sept. 30, 1921. On the latter date carbonizing operations were commenced in the new retorts. Mr. Atley also details the reconstruction work in connection with the purifying plant.]

REORGANIZATION OF THE CARBONIZING AND PURIFYING PLANTS AT THE STOCKTON CORPORATION GAS-WORKS.

Before presenting my Presidential Address, I would like to take this opportunity of again thanking you for the honour you have conferred upon me in electing me to the position of President of the North of England Gas Managers' Association. I realize that the position has been filled previously by men of undoubted ability in the gas engineering profession, and I will use my best endeavours to uphold the traditions of the office. Presidential addresses are often used as a medium for dealing with important questions of industry, affecting the gas industry, which are for the time being to the fore. I consider, however, that the results of practical experience of works reconstruction

THE PRESIDENT.
Mr. W. W. Atley, of Stockton.

are always of interest, and probably of practical assistance to some gas engineers who may be faced with a similar task; and I have therefore decided to give a description of the reorganization of the carbonizing and purifying plants at the Stockton Corporation Gas-Works.

HISTORICAL.

At the outset, I think a few historical facts regarding the Stockton gas undertaking will not be out of place. Gas was first supplied in Stockton in 1822 by the Stockton Gas Consumers' Company, Ltd. In 1845 a new Gas Company was projected, and meetings were held between the provisional Directors and the Committee of the old Company. On Dec. 18, 1845, an amalgamation was agreed upon, when it was decided to fix by arbitration the value of stock and materials to be transferred. The premises, works, and apparatus were accordingly valued at £5532. The capital of the new Company was fixed at £7980, in 840 shares of £9 10s. each. An Act of Parliament was obtained the following year. The price of gas at this time was 10s. per 1000 c.ft., and was reduced in 1850 to 5s. In 1857 the Corporation obtained Parliamentary sanction to purchase the works of the Company, which were then in operation at the south end of the High Street, on a site now partly occupied by the County Court Buildings; and it is inter-

esting to note that in the cellars can be seen a portion of the original wall of a brickwork gasholder tank.

The growth of the undertaking can perhaps best be indicated by the following tabulated statement:

Year.	Total Coal and Carburetted Water Gas Sold and Used on Works (C.Ft.).	Capital Expenditure.
		£
1875	115,926,000	50,624
1885	187,455,000	109,204
1895	285,253,300	154,249
1905	357,010,000	204,868
1915	389,961,000	223,798
1925	511,420,800	349,865

Although the total capital expenditure to 1925 amounts to £349,865, the actual capital debt is only £100,697, due to the operation of the sinking fund. Also, if the whole of the gas profits had been utilized for redemption of capital, the undertaking would now be entirely free from capital debt.

Several local Acts of Parliament have been obtained, whereby the area of gas supply has been extended from time to time. The limits of supply to-day comprise the boroughs of Stockton and Thornaby, the urban district of Billingham, and the parishes or townships of Eaglescliffe, Aislaby, Longnewton, Elton, Wolviston, and Newton Bewley.

In 1923 we were approached by the Directors of the Yarm Gas Company, Ltd., to consider the purchase of their undertaking. Terms were agreed upon; and from July, 1923, we have provided a supply of gas to the township of Yarm-on-Tees. As we have reduced the price by about one-third since the gas was supplied from the Stockton Gas-Works, the consumers in Yarm have benefited considerably. The gas-works at Yarm ceased manufacturing operations immediately the connecting mains had been laid; and in order to maintain a constant pressure, the two small holders at these works have been requisitioned—a valve on the trunk main from Stockton being used to regulate the supply of gas so as to maintain the holders at the required height. This method of working has given satisfaction; the pressure on the holder outlet not varying more than 3-10ths during the twenty-four hours. The holders will not throw a greater pressure than 32-10ths, and, in consequence, it has not been found necessary to use the station governor, which remains by-passed.

A little over a year ago negotiations were entered into between the Stockton Corporation and the Haverton Hill Gas Company, Ltd., for the acquisition of the Haverton Hill gas undertaking. The purchase has been amicably settled; and as the Stockton Corporation were promoting a Parliamentary Bill for other purposes, statutory powers were sought at the same time for the taking over of this undertaking, and also to include the parish of Cowpen Bewley in our statutory area of supply. The Bill received the Royal Assent on Aug. 8 last; and we are now engaged in linking-up the gas mains at Haverton Hill to those of Stockton, so that very shortly the Stockton works will be called upon to provide a further 30 to 35 million c.ft. of gas per annum.

The total area of gas supply, including Yarm, Haverton Hill, and Cowpen Bewley, is approximately 55 square miles, and the length of mains 104 miles.

RE-MODELLING THE CARBONIZING PLANT.

In January, 1920, I took over the management of the Stockton-on-Tees Corporation gas undertaking, when, you will no doubt remember, trade conditions were very good—especially in iron and steel—resulting in an increase in the gas consumption which made it very difficult to maintain an adequate supply at peak load. The question of retort house extensions had already been considered some years previously; but the war came along, and the matter was compulsorily postponed. Every available retort and the carburetted water gas plant (600,000 c.ft. per day) had to be operated to the fullest extent; but even under these conditions it was extremely difficult to meet the increasing demand for gas, and during the period of the peak load the pressure had to be curtailed in the daytime in order to maintain a satisfactory pressure during the lighting period. On one occasion we made a special effort to supply the full needs of the consumers throughout the twenty-four hours, when 2,430,900 c.ft. of gas were consumed, or 9·25 p.ct. more than we had been able to produce on an average per twenty-four hours during the previous three weeks. The gasholders lowered during this experiment to such an alarming extent that it took ten days to recover. Needless to say, I did not wish to repeat the occurrence.

The experience of endeavouring to supply gas under such trying conditions during the winter 1920-21 emphasized the importance of seriously considering the question of reorganizing the existing carbonizing plant, which consisted of two benches each built for ten beds of retorts 15 in. by 21 in. by 19 ft. 3 in. long, ⌂ section. The retort bench at the south end of the house had one arch which was not filled-in with retorts, owing to the fact that there was not sufficient space to allow the charging machine to be used, and another empty arch which had not been reset with retorts—in anticipation of the demolition of this bench. The total capacity of the eighteen beds of retorts was approximately 1,625,000 c.ft. per twenty-four hours (average conditions), *plus* 600,000 c.ft. of carburetted water gas, giving a total capacity of 2,225,000 c.ft. per twenty-four hours.

At this period the labour market generally was in a flourishing condition, and in consequence we had the greatest difficulty in obtaining suitable men to act as stokers and retort firemen. It cannot be denied that the working conditions of cleaning the furnaces in a subway 8½ ft. wide by 7 ft. high were very trying; and therefore a number of the beds which were provided with double furnaces were altered so that only one fire per bed had to be cleaned, and so as to reduce the stokers' work in raking-out by hand the coke required to feed the furnaces on the machine side of the bench. This somewhat reduced the gas output per bed, but had the effect of relieving the working conditions to an appreciable extent. The beds prior to these alterations were at times worked on six-hour charges. This arrangement was modified to eight-hour charges with increased weight of coal per retort, with the stokers, &c., still working three eight-hour shifts.

The indifferent quality of the coal in 1920-21 also caused a great deal of trouble in maintaining the heats. Having these adverse labour conditions in mind when designing the new carbonizing plant, particular attention was paid to the producer side of the bench; and as a result, I claim that the firemen to-day have easier and much healthier working conditions. This is proved by the fact that we now have no trouble in obtaining good men for cleaning the fires.

Reference should be made to the method employed for dealing with the pan ash. A single track of light rails (35 lbs.) runs the whole length of the bench on the clinkering floor, and has a fall of 6 in. towards the chimney. The ashes are shovelled from the furnace ash pans direct into a solid-plated skip, which rests on an easy-running bogie (fitted with roller bearings). The full skip is easily pushed along the rails until it is clear of the stage floor, and then hooked on to the low-level telpher. The ashes are deposited on a sloping bench near to the elevator pit of the clinker washer.

You will observe from fig. 1 that the gas-works site is a very congested one; and in view of the fact that the costs of material and labour were at a high level, it was a matter for serious consideration whether I should advise my Gas Committee to build a new retort house on the Lucan Street land, or demolish a portion of the existing retort house and rebuild with up-to-date plant. The drawback to the latter was that one bench of retorts could only be dispensed with at the end of March or early in April, and the new retorts would have to be in operation by the 1st of October, if an adequate supply of gas to the town was to be maintained. After the two schemes had been carefully considered, my Committee decided on the latter.

The existing retort house was built in 1875, and was provided with coal stores on each side, with an overhead gantry from which the coal was dropped. The 18-in. walls between the retort house and coal drops were provided with a series of archways, through which the coal was originally obtained for shovel-charging the retorts. Steel continuous overhead coal bunkers, with a coal elevator and belt conveyor with throw-off carriage (gas-engine driven), together with separate De Brouwer discharging and charging machines, were installed in 1905.

In conjunction with this plant, hot coke conveyors were erected to deliver the coke from each end of the retort house towards the centre, where a gravity bucket conveyor delivered it on to a radial tray conveyor, finally depositing the coke into one of three hoppers for filling railway wagons, carts, and barrows respectively. In 1918 the foregoing coke plant was dismantled, and in its place an electrically-driven coke telpherage plant was installed; the coke being discharged from the retorts into skips placed on iron bogies, which were propelled to the centre of the house and attached to the telpher, and then quenched in an overhead cast-iron tank. Owing to the war-time restrictions and the difficulty of obtaining steel sections, the telpher track standards were constructed of reinforced concrete. This will be referred to later in dealing with the extension of the telpher track.

The preliminary work in connection with the scheme generally consisted of first demolishing the existing plant; the work being carried out (with the exception of the removal of the retort house roof) by our own workmen, as follows:

(*a*) Continuous coal bunkers of small capacity.
(*b*) Retort bench and ironwork.
(*c*) Retort house roof—52 ft. 6 in. span.
(*d*) 18 in. wall between retort house and coal store on west side.
(*e*) Filling-in clinkering floor subways, and spaces used for regenerator tubes and furnaces.

and then installing:

(1) A bench of eight beds of retorts, each bed containing ten retorts (in five tiers) 24 in. by 18 in. by 23 ft. long ⌂ shaped, on the stage-floor principle.
(2) Combined stoking machinery.
(3) Continuous overhead coal bunkers.

} Carried out entirely by contractors.

FIG. 1.—PLAN OF THE STOCKTON CORPORATION GAS-WORKS.

(4) Two complete and independent sets of coal breakers and elevators. — Constructed and erected by direct labour, with the exception that contractors erected the elevator casing.

(5) Alteration of old coal store to allow the coal to be mechanically handled. — Carried out by direct labour.

(6) Steel framing for retort house walls, which required to be raised from 20 ft. to 45 ft. at eaves. — Constructed by direct labour and erected by contractors.

(7) Provision of new retort house roof, 66 ft. span.

(8) Alteration of existing telpher track. — Direct labour throughout.

A contract was entered into with Messrs. Drakes Limited, of Halifax, for eight beds of ⊐ section retorts 24 in. by 18 in. by 23 ft. long, complete with combined charging and discharging machine, hot coke shoot, scurfing platform, and overhead coal storage bunker, working on a stage floor 11 ft. above the then existing floor level.

Although a portion of the retort ironwork was dismantled as soon as the definite scheme of reorganization had been decided

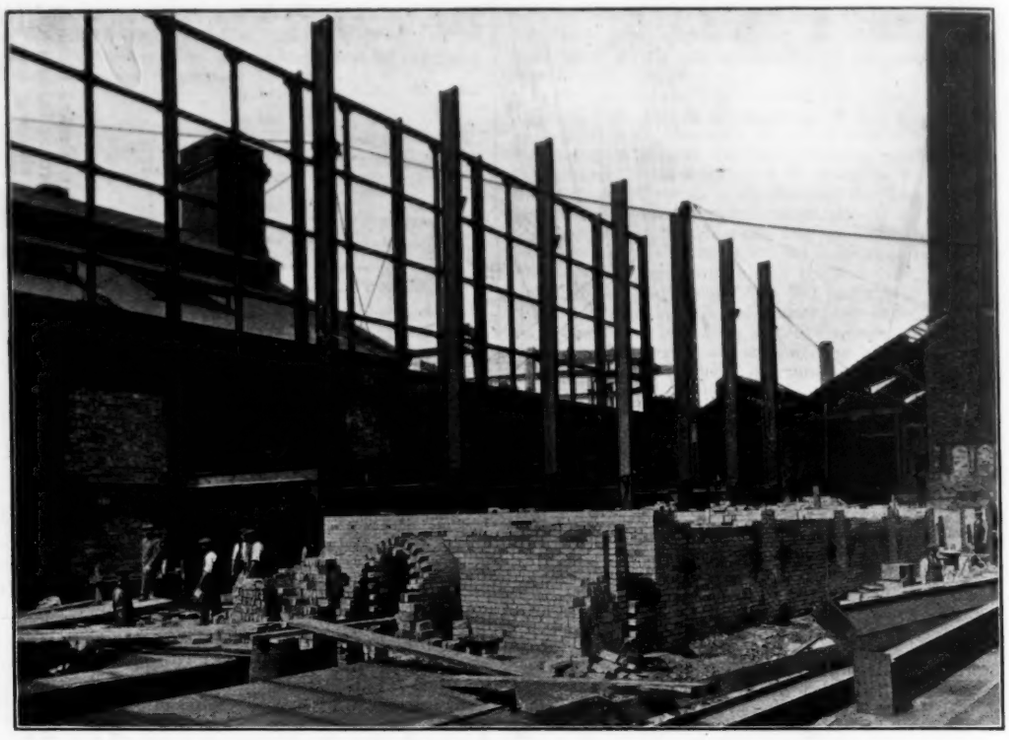


FIG. 2.—VIEW FROM SOUTH, SHOWING MAIN FLUE AND STEEL FRAMING.

upon, the retort brickwork could not be interfered with until a reduction in consumption would allow gas-making operations to be dispensed with on the retort bench at the south end of the retort house, which it had been decided to reconstruct. It was also necessary to provide a temporary 15-in. diameter foul main, which was fixed to the east side of the retort house wall in the open, to convey the gas from the remaining ten beds of retorts to the inlet of the condensers. The retort bench at the south of the house was not finally shut down until April 25, 1921. The whole of the ironwork was dismantled by May 25, and by June 4 the whole bench had been demolished.

When the site had been levelled-up, a reinforced concrete raft was constructed, so that all four sides extended 4 ft. beyond the building line of the retort bench, to provide ample support for the front and end buckstays. Expanded metal, 3-in. mesh, with strands $\frac{3}{8}$ in. by $\frac{3}{16}$ in. thick, was laid over the full length and breadth of the raft. The concrete foundation was 24 in. thick throughout, being of a 5 to 1 mixture, consisting of 4 parts of aggregate and 1 part each of sharp sand and cement—using a "Blystone" concrete mixer operated by means of a $4\frac{1}{2}$-H.P. petrol engine. This machine worked splendidly, and, being portable, was a means of expediting the foundation work very much indeed. The concrete was suitably strengthened-up at the following points:

(*a*) Main flue.
(*b*) Furnaces.
(*c*) End and side buckstays.

The concrete aggregate, consisting of old retort material already on the site, was broken by means of a semi-portable stone-breaker, and to save unnecessary handling was broken-up at the same time as it was required for mixing.

The foundations were commenced on June 15; and we had enough work completed on June 20 to allow six of Messrs. Drakes' retort setters to commence setting-out the main flue, pier walls, and the furnace of the regenerators. Shortly afterwards the retort setters were engaged to work in two shifts of eight hours each; and as the work proceeded the number of bricklayers engaged at one time reached sixty, excluding labourers. Photograph fig. 2 shows the condition on July 5—*i.e.*, fifteen days from the commencement. From this date the work was sufficiently opened out to warrant further retort setters being engaged.

In order to introduce a stage floor, it was necessary to increase the height of the retort house roof by 25 ft., as previously stated. The existing retort house walls were not considered substantial enough to carry any extra weight; and it was decided to provide a steel framing, the panels being filled-in with $4\frac{1}{2}$-in. brickwork. This steel framing, and also the new retort house roof, were constructed at the gas-works by direct labour. The old retort house was increased 13 ft. 6 in. in width by taking in the coal store on the west side, to provide the extra space required for the new retorts, which were 3 ft. 9 in. longer than the existing ones. As the brickwork was proceeding, the erection by the contractors of the bench ironwork, retort house framing, and stage floor was commenced; and this was utilized as scaffolding for the retort setters. In designing the roof, ample allowance was made with the various sections to compensate for the severe corrosion which invariably takes place under such working conditions.

Photograph fig. 3 shows the progress of the work up to

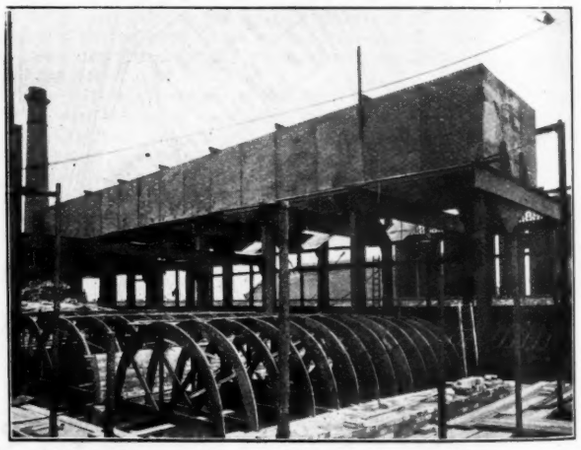


Fig. 3.—Retort Bench Arches and Overhead Coal Bunkers.

Aug. 4, when a commencement was made with the setting of the retorts, and a good portion of the overhead steel coal storage bunkers had been erected. Photograph fig. 4 shows the progress made up to Sept. 21. By this time the retort mountings had been practically completed on three beds; the combined stoking machine erection had been nearly completed; and the concreting of the stage floor had been commenced. This photograph is a view of the south gable depicting the $4\frac{1}{2}$-in. brickwork panelling and the fixing of the roof purlins. Figs. 5 and 6 show the cross-section and plan respectively of the retort house. You will observe in fig. 5 the old coal drops which have been utilized to provide useful coal storage.

The new furnaces are of the step-grate type, and the arduous work is now reduced to a minimum. The firemen attend to the furnaces every two hours, and withdraw the clinker with a light rake. The working space on the new clinkering floor is 19 ft. wide by 12 ft. high, which ensures the best possible working conditions.

Coal Storing and Handling.

The existing coal store walls were each underpinned in turn, and two 12 in. by 6 in. rolled steel joists fixed to carry same. Excavation was carried out to a depth of 7 ft., to provide for

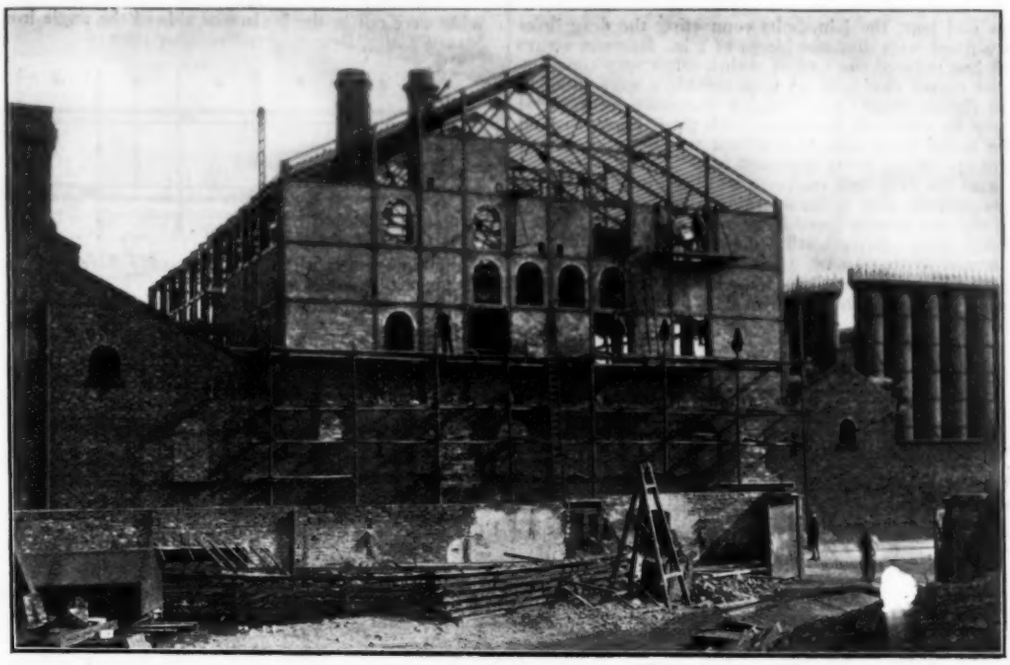


FIG. 4.—SOUTH GABLE, SHOWING BRICK PANELLING, &c.

walking space and the fixing of a band conveyor below these walls. A concrete roof was placed over this conveyor, which acts as a floor for the coal store, on to which the coal is tipped from the wagons. Six cast-iron shoots, fitted with radial doors, are fixed in this concrete roof, to allow the coal to fall as required on to the band conveyor, which carries same into the side of the coal receiving hopper over the coal breakers (see fig. 7). The band conveyor is operated from the coal breaker shaft by means of bevel gearing and jaw clutch. It is only required in case of temporary shortage of coal deliveries from the collieries, and experience has proved its utility.

Simultaneously with the work being carried out by Messrs. Drakes, two separate coal breakers and elevators were being constructed by direct labour, as shown in fig. 5; each unit being driven by a 50-H.P. "National" gas engine. The coal breakers consist of two sets of double rolls, the cast-steel segments being fixed on a square shaft with journals 4½ in. in diameter; the top rolls breaking the large pieces of coal to about 4 in. cube, and the small rolls further reducing them to 1¼ in. cube. The coal is emptied by means of bottom-door wagons into a receiving hopper of 40 tons capacity, and is delivered by a jigging feeder to the coal breakers.

Great difficulty presented itself in designing the coal elevating plant so that the existing coal gantry and stores could be utilized, and at the same time provide for ample overhead coal storage equal to forty-eight hours' carbonizing requirements. For this purpose, it was found impracticable to design a perfectly straight coal elevator, on account of the clearance required when the stoking machine was operating on the top tier of retorts; and therefore the upper section of the elevator had to be designed on the curve. Wearing strips of 2 in. by ½ in. mild-steel flats were fitted to the angle-iron runners by means of countersunk headed bolts. At the end of six months' working, it was noticed that these wearing strips were practically worn through, and in consequence we have substituted greenheart timber, 2 in. by ¾ in., on the curved portion. This alteration has given much longer life to the wearing strips, and also to the skidder bars attached to the elevator buckets.

The elevator chain comprises two strands of No. 600 6-in. pitch "Leys" bushed chain. The elevator buckets are of 8-gauge pressed steel 17½ in. wide, with a capacity of 860 cubic inches, fitted with a 1½ in. by ⅞ in. strengthening lip. Each alternate bucket has the strengthening lip with a serrated edge, to plough through the coal which might set hard in the elevator boot. With this device we have not had a single elevator bucket distorted in shape; and I can therefore thoroughly recommend it.

Working in conjunction with the coal elevators is a drag link conveyor 12 in. wide by 100 ft. long, which is driven from a 3 in. diameter line shaft with roller bearings, fixed along the top of the bunker. This conveyor is provided with a chain drive from either coal elevator, which is put in and out of gear by means of jaw clutches. Suitable tightening gear is arranged on the drag link conveyor; and in order to provide against

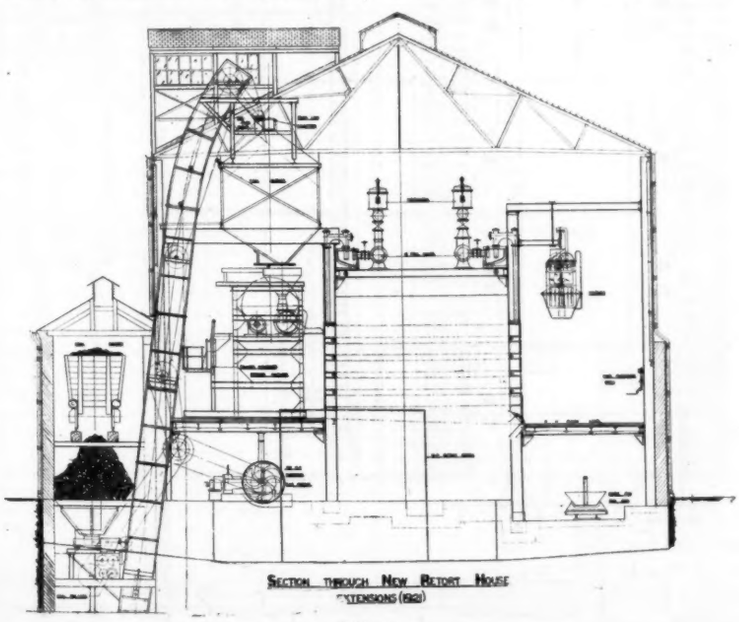
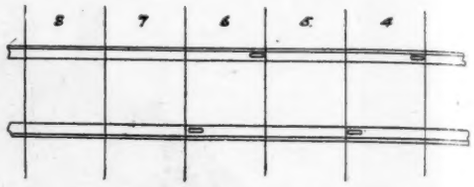


FIG. 5.

undue wear and tear, the ⅞-in. bolts connecting the drag links together are fitted with distance pieces of 1 in. diameter steam tube, which has reduced the cost of maintenance very considerably. At the outset cast-iron hexagon tumblers were fitted at each end of the conveyor; but owing to excessive wear, these were replaced by cast-steel tumblers, with three horns cast on same. The latter have been in constant use for over twelve months, and are giving every satisfaction.

Shortly after the drag link conveyor had been put into operation, it was noticed that a considerable amount of fine coal collected in the end bunker (over No. 8 bed) immediately under the tightening gear. Investigation proved that this was due to the small coal settling on the 4½ in. by 4½ in. by ⅝ in. angle-iron runners, which was carried along by the conveyor links to the extreme end. To obviate this, slots 6 in. long by 2 in. wide were cut in the horizontal side of the angle iron over beds Nos. 4 and 6, in a diagonal manner thus:



By this means the small coal is equally distributed over the full length of the overhead bunkers.

Each coal breaker is capable of dealing with 45 tons of coal

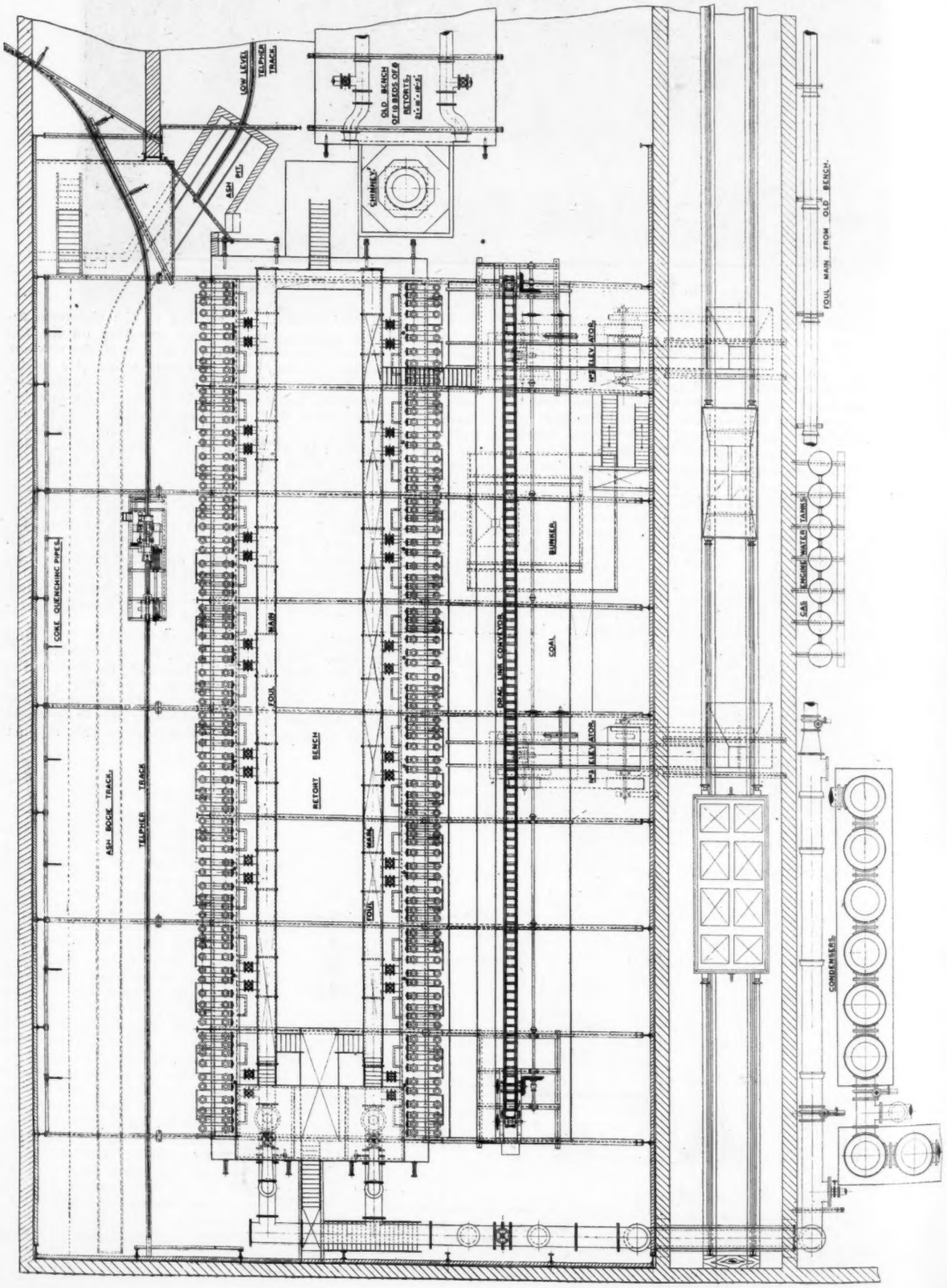


FIG. 6.—PLAN OF RETORT HOUSE.

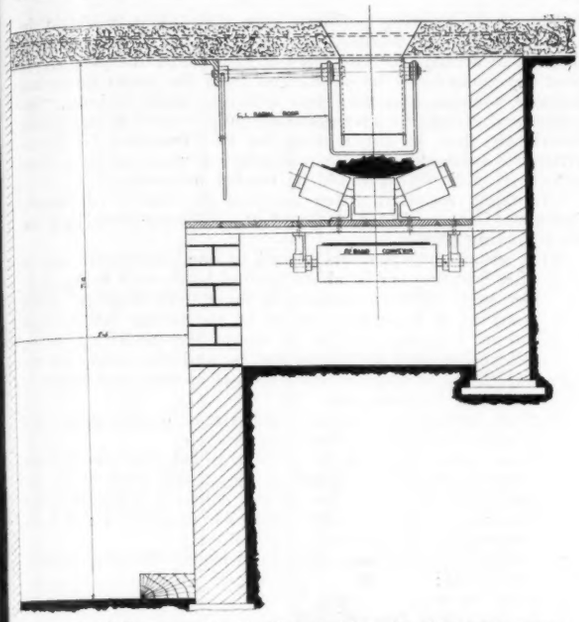


Fig. 7.—Band Conveyor and Feeding Spouts under Coal Store Floor.

per hour, and as the coal storage bunker has a capacity of 320 tons (or more than 48 hours' supply) we have been able to dispense with work on coal elevating and the use of the locomotive at week-ends and holiday periods.

TELPHER TRACK.

The existing electric telpher for dealing with the coke terminated in the retort house at right angles to the retort bench; the track rail being supported by the chimney brickwork. As previously mentioned, the telpher track standards were constructed of reinforced concrete. This made it very difficult to connect-up the new telpher track along the front of the retort bench with the existing telpherage, and in consequence the curved portion could not be constructed with a radius less than 19 ft. 3 in. This is a curve which cannot be recommended, as it retards the travelling of the telpher. In our case the speed of carbonizing operations is governed by the rate at which the coke can be removed from the retort house; and it would have been a distinct advantage to be able to eliminate such a sharp curve on the telpher track.

The 2 in. circumference galvanized wire hoisting ropes are examined each morning by the foreman mechanic, and a record made in a book provided for that purpose. To eliminate the danger of accident by over-winding the hoisting drum or the sudden failure of the wire ropes, we designed a safety hook arrangement (see fig. 8) which is simple in construction and positive in action. The telpher drivers are instructed not to travel unless the coke skip is engaged by these safety hooks. These men feel a sense of security now that such a device is in use.

RETORT BENCH FITTINGS.

Reverting to the retort bench, by Sept. 1 the brickwork for four beds of retorts had been completed, and on Sept. 16 the brickwork of the whole of the eight beds was finished. A slow fire was put into the first bed immediately it was completed, in order to dry the brickwork; and on Sept. 30 carbonizing operations were commenced. Considering the late date at which the old bench was available for demolition, I think this constitutes a record.

The new 18 in. diameter foul main consisted of specially made flanged pipes, each joint being formed with eight ⅞ in. diameter bolts and Scott's cement jointing. As each hydraulic main had two Weir valves which were already fixed, any increase in the thickness of the foul main joints had a cumulative effect in displacing the tee connections between the hydraulic and foul mains. The number of foul main joints affected was fourteen on each length, and we had some difficulty in fitting these together. Experience proves that, while it is very desirable to have flanged joints wherever possible, it is a distinct advantage to have at least one socket-and-spigot joint which can be made after the flanged joints have been finally tightened-up. The two existing 10-in. retort house governors were re-erected at the same time as above.

A new 24-in. diameter foul main was fixed to replace the existing 14 in. diameter main at the south end of the new retort bench, and is provided with suitable valves and connections for the installation of a larger retort house governor, which will be capable of dealing with the gas produced from the whole of the retorts, when it is decided to reconstruct the remaining half of the carbonizing plant. Similarly the new 18 in. diameter foul mains parallel with the hydraulic mains will be extended the full length of the retort house. By means of these provisions, the cost of completing the reconstruction will be considerably

FIG. 6.—PLAN OF RETORT HOUSE.

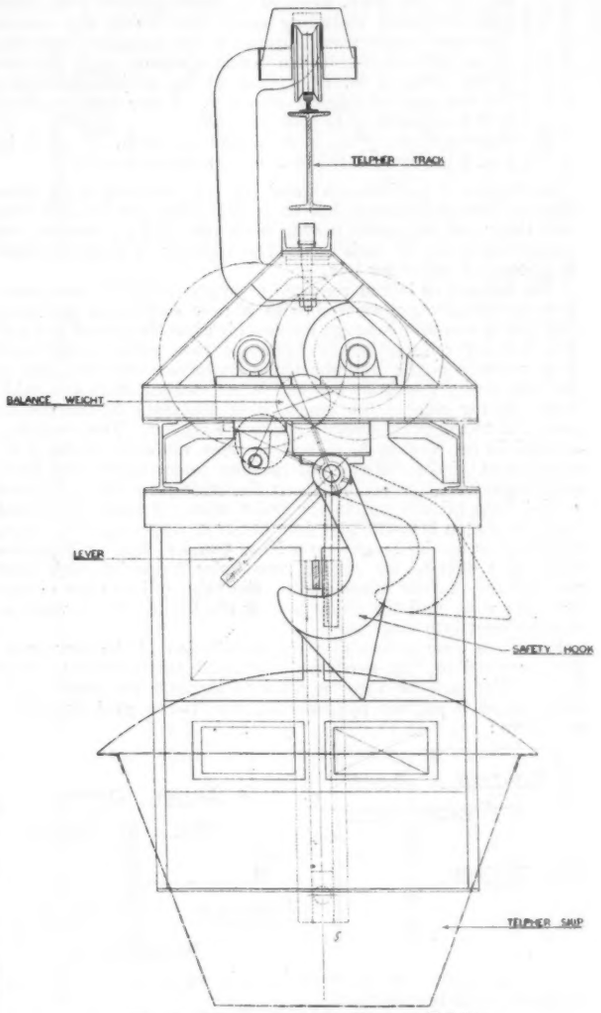


Fig. 8.—Mild-Steel Safety Hook on Telpher.

reduced, and at the same time it will be a much easier job. The new carbonizing unit, being much larger than that replaced, will allow the shutting-down of the old bench at a date much earlier than April 25; and the new bench can be started at a date later than Oct. 1.

CARBONIZING COSTS.

The carbonizing costs were considerably reduced after the new retort bench had been installed; and the following comparative figures between the old and new systems clearly indicate the marked improvement which has resulted:

	Old Bench.	New Bench.
—	8-Hour Charges.	12-Hour Charges.
	3 Shifts of Stokers.	2 Shifts of Stokers.
Foremen	3	3
Telpher drivers	3	2
Stokers	18	8
Stoking machinery	6	2
Hydraulic main attendant	1	1
Firemen	2½	3
Sweeper-up	1	..
Elevating coal	4	1½
Scurfing retorts	1	1
Exhauster attendants	3	3
Locomotive driver	1 part time	1 part time
Locomotive shunter	1 ,, ,,	1 ,, ,,
	44½	26½
Coal carbonized per week	560 tons	1050 tons
Gas made	6,318,900 c.ft.	13,650,000 c.ft.
B.Th.U. per c.ft.	420	500
Wages cost per ton of coal carbonized	6s. 1·94d.	1s. 10·8d.
Wages cost per 1000 c.ft. of gas made	6·55d.	1·76d.

The above costs are based on to-day's rates of wages.

PURIFYING PLANT.

Since 1915 the whole of the coal and carburetted water gas has been purified by means of oxide of iron. The plant in 1920-21 consisted of:

(A) Two water-lute purifiers (Nos. 5 and 6) 32 ft. 8 in. by 25 ft.

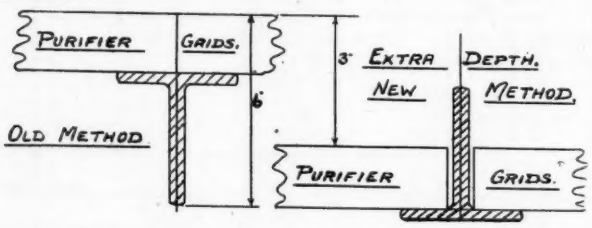
by 4 ft. 4 in. deep, fixed 10 ft. above ground level, fitted with overhead travelling crane for lifting the covers. The fresh oxide was delivered to the purifiers by means of an electrically driven oxide elevator with buckets 9¾ in. long, 5 in. deep, and 4¼ in. projection, and a Zimmer type of jigging conveyor. These purifiers have each a capacity of 55 tons of oxide.

(B) Four purifiers (Nos. 7, 8, 9, and 10) 28 ft. by 20 ft. by 4 ft. 4 in. deep, fitted in a similar manner as (A).

Both sets of purifiers (A) and (B) are provided with three tiers of horizontal grids, but at present they are worked with two tiers; the top grids having been removed to increase the amount of oxide in each box. The capacity of these purifiers is 45 tons of oxide per box.

The amount of labour required to empty and refill these purifiers is excessive, compared with a new section of purifying plant with bottom discharge doors which has since been erected. The railway enters the old house at two points underneath Nos. 5 and 6 boxes, and the oxide is thrown over the side of the box into the wagons below. When dealing with the oxide from the far side of the boxes, it is necessary to carry each shovelful to the point directly above the wagon. The emptying operations on Nos. 7, 8, 9, and 10 were more expensive still, on account of the railway not running underneath; and three extra men were needed to barrow the oxide from the box (after it had been broken up) to the point where it could be tipped into the wagon below. The time taken in emptying these purifiers was naturally longer than Nos. 5 and 6, but an improvement was effected by cutting two holes (opposite each box) through the purifier house wall. The railway line runs alongside this wall, and the oxide is now discharged down wooden shoots direct into wagons.

For some time previous to the installation of the new purifiers referred to, the need for additional purifying area was keenly felt; and we were enabled to increase the amount of oxide in each purifier by inverting the T-iron grid supports, as shown:



With this alteration, an extra 3½ in. in the depth of oxide was obtained on the bottom tier.

The plant existing in 1920-21 was totally inadequate to deal with the increasing demand for gas; and I received instructions from my Gas Committee to report on the subject of extensions. The question of a suitable site needed very careful consideration, as the space available for additional buildings was so limited. For convenience in working and simplifying the gas connections, it was decided to erect the new plant alongside the house containing purifiers Nos. 7, 8, 9, and 10. Owing to the excessive labour costs in dealing with the emptying and refilling of the existing purifiers, care was taken to obtain the easiest method of working the new plant. It was therefore decided to arrange for two lines of rails under the purifiers, so that the oxide could be discharged from the boxes direct into railway wagons, and thus deal with the oxide in bulk. The refilling of the purifiers necessitated the provision of an elevated revivifying floor of ample area, for two reasons: (1) To revivify the oxide efficiently in readiness for use; and (2) to store sufficient oxide which would be readily accessible.

Ultimately my Committee accepted the tender of Messrs. Ashmore, Benson, Pease, & Co., Ltd., of Stockton-on-Tees, for the following plant:

(*a*) A set of four purifiers placed in one continuous line on the first floor 13 ft. above ground level, each being 25 ft. by 35 ft. by 6 ft. deep, with three tiers of grids. Each purifier to have four covers of the Green luteless type 10 ft. 2 in. by 14 ft. 2 in. complete with lifting tackle, Pickering inlet and outlet valves, and also valves for upward and downward flow—the valves and connections all being 24 in. diameter.

(*b*) Steel-framed building with superstructure for supporting the purifiers and connections.

(*c*) Nine 24 in. by 7½ in. by 100 lbs. rolled steel joists, for a concrete revivifying floor on the second floor above the purifiers; the condition of the contract being that the work must be completed within five months, which I am pleased to say the contractors fulfilled.

The following work was carried out by the Gas Department by direct labour:

(*a*) Foundations.
(*b*) Brickwork of two end gables.
(*c*) Construction of steel roof.
(*d*) Laying of reinforced concrete revivifying floor.
(*e*) Construction and erection of oxide breaking plant, consisting of primary breaker, elevator, and band conveyor, with automatic traversing throw-off carriage.
(*f*) Two lines of railway sidings for emptying purifiers.

There was also purchased and fixed a high-speed disintegrator, with grinding cages rotating in opposite directions, of 12 tons per hour capacity. Figs. 9 and 10 show the general design of the plant when completed.

The site for the purifier extensions was cleared, and the ground excavated for the concrete foundations. Precautions were taken to ensure the foundations being of ample strength and area. These consisted of nine reinforced concrete piers 3 ft. 6 in. square along the east side of the house for supporting the 10 in. by 6 in. rolled steel joist main stanchions of the building, each capable of taking a dead load of 32 tons. There were nine similar piers on the west side, 4 ft. square, capable of taking a dead load of 45 tons. Nine extra-large concrete piers were placed about the centre of the house, 6 ft. square, strongly reinforced, for receiving the cast-iron columns supporting the purifier and revivifying floor, allowing for a load of 62 tons each. The holding-down bolts for all the foundations were 1¼ in. diameter.

After the foundations had been completed by the Gas Department, Messrs. Ashmore, Benson, Pease, & Co. proceeded with the structural work. The building consists of ten bays, eight of which are 10 ft. centres, and two end bays of 12 ft. 6 in. to inside of gable walls. To support the purifiers, nine 24 in.

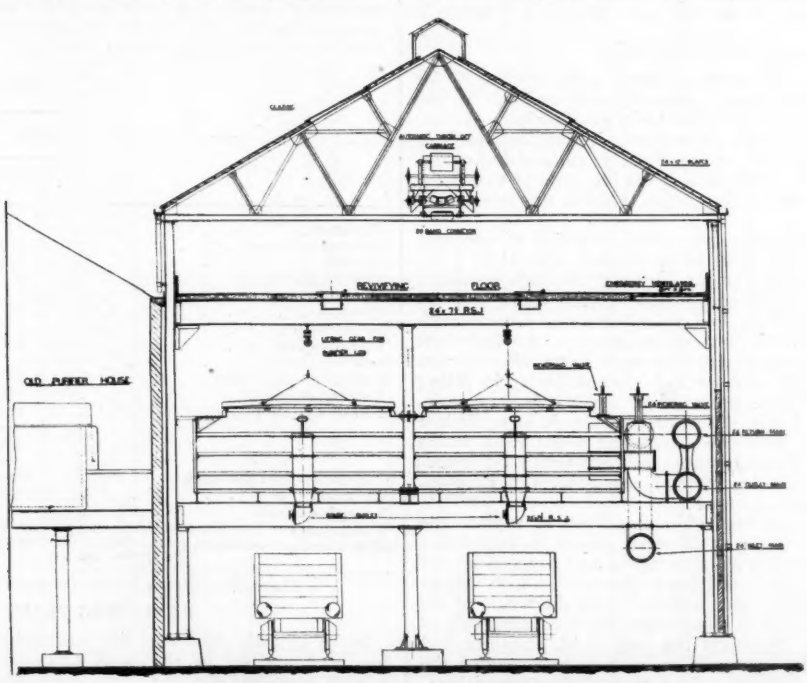


FIG. 9.—SECTION THROUGH NEW PURIFIER HOUSE.

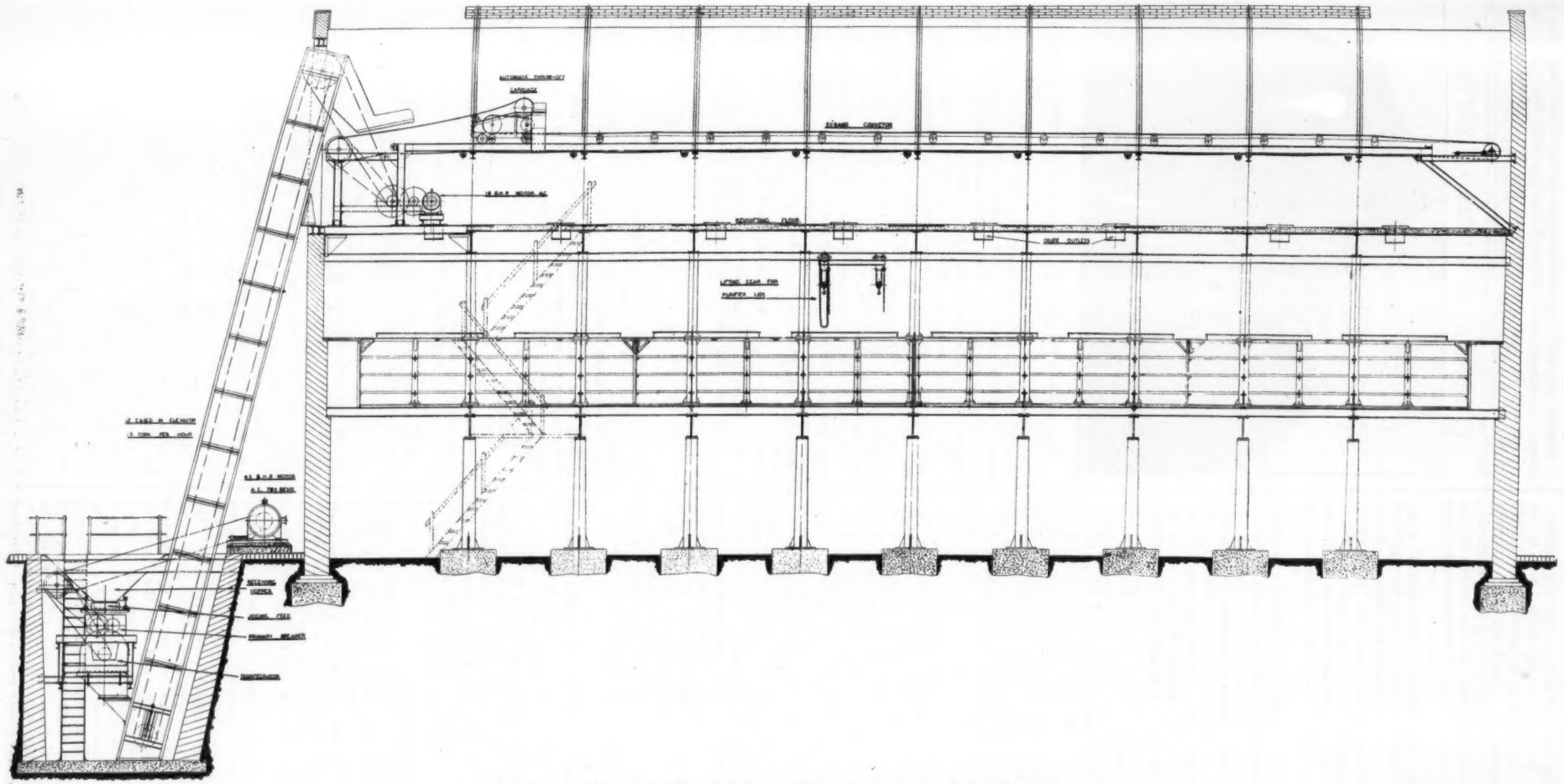


FIG. 10.—LONGITUDINAL SECTION THROUGH NEW PURIFIER HOUSE.

by 7½ in. by 100 lbs. rolled steel joists were fixed horizontally across the house. These joists rested on 10 in. by 6 in. by 42 lbs. joists bolted on to the 10 in. by 6 in. main stanchions, and were both fixed to a ½ in. thick baseplate. A cast-iron column of strong design was fixed in the centre of each of the above 24 in. by 7½ in. joists. The boxes in turn were directly carried by eight 10 in. by 5 in. rolled steel longitudinal joists running the full length of the house, fixed on top of the 24 in. by 7½ in. girders. Lugs were cast on the outside plates of the purifiers for receiving the 9 in. by 3 in. timber platform which is fixed along both sides and ends of the boxes level with the top plate. This platform was also carried by 6 in. by 3 in. rolled steel channels, which were secured to the 10 in. by 6 in. steel main columns; the gable walls being suitably recessed to receive same. The horizontal members for the 4½ in. brick panelling consist of five lines of 7 in. by 4 in. rolled steel joists with the web laid horizontally to receive the 4½-in. bricks.

Revivifying Floor.

This floor, 10 ft. above the purifier platform, is carried by nine 24 in. by 7½ in. by 100 lbs. joists, fixed from column to column of the steel framing. These are secured to the main columns by large plate and angle corner brackets, and also supported about the centre of the span by strong cast-iron columns, which are fixed to cast-iron columns inside the purifiers. These in turn are carried by cast-iron hollow packing pieces, which are fixed between the bottom of the purifiers and the 24 in. by 7½ in. rolled steel supporting joists, thereby transmitting the load to the cast-iron columns which support the main girders carrying the purifiers. Secured to the bottom

flange of the 24 in. by 7½ in. rolled steel joists are two lines of 8 in. by 4 in. rolled steel joists running the full length of the house, along which the lifting gear for the purifier lids travels.

The concrete revivifying floor is 6½ in. thick, and is reinforced by means of expanded metal, 3 in. mesh, with strands ¼ in. by $\frac{3}{16}$ in. in thickness, placed ¾ in. from the bottom of the floor. Over each 24 in. by 7½ in. supporting joist, expanded metal tension strips 4 ft. wide, running the full width of the floor, were placed 1½ in. from the top of the concrete, thus forming one continuous beam.

The timber for supporting the concrete, consisting of 7 in. by 1½ in. planking, was carried on wooden lattice type girders 20 in. deep, fixed about 3 ft. centres across the house. These girders were made to fit in between the 24 in. by 7½ in. rolled steel joists with wooden wedges about 3 in. square. When the floor was set, these wedges were knocked out, and the wooden girders removed, enabling same to be used in another bay.

The floor was composed of 4 parts of whinstone chippings ¾ in. to ¼ in., 2 parts of sharp clean river sand, and 1 part of cement. The reason for using whinstone chippings was the fact that none of the slag firms would guarantee the slag to have less than 2 to 3 p.ct. of sulphur content, whereas the whinstone contained less than 1 p.ct. Each bay was left for ten days before the masking was disturbed, and no heavy weights were allowed on this green concrete for four weeks. One bay was completed in three days.

After the floor was fully completed and set, it was given a coating of "Ironite" compound ½ in. thick. Before applying this mixture, the concrete floor was well soaked with water. The "Ironite," in the form of a slurry, was then laid on between ½-in. laths fixed 3 ft. apart, and levelled with a piece of board. When this stiffened, the surface was well trowelled over, and allowed to set. Next day, water was sprinkled by means of a watering can on to the finished surface, which was then re-trowelled; and this was repeated for two following days. This has proved to be an ideal shovelling surface, being hard and smooth; and it also acts as a protective covering to the concrete. The "Ironite" compound was mixed in the following proportions: 25 lbs. "Ironite," 100 lbs. cement, and 100 lbs. sharp river sand, which worked out at 2½ lbs. of "Ironite," 10 lbs. of cement, and 10 lbs. of sand per square yard.

An opening 9 ft. by 6 ft. was left in the above floor to act (1) as an emergency ventilator, to be used if necessary when a purifier is being emptied, and (2) to provide space required for lifting-up spare parts in case of repairs to the band conveyor and throw-off carriage. A wood cover in three parts is provided for the opening, fitting level with the surface of the floor.

Sixteen cast-iron spouts 18 in. diameter, with loose sliding lids, were fixed in the concrete floor to act as feeders for filling boxes. These were supported in the concrete on 1 in. diameter mild-steel rods 9 ft. long, to distribute the weight over a larger area. Circular-headed cast-iron window frames were provided for lighting and ventilation, and, in addition, on the east side of the revivifying floor a 6 ft. 6 in. opening for the full length of the house was provided, as shown on the cross-section fig. 9. This, in addition to the open louvre in the roof, provides adequate ventilation to ensure rapid and complete revivification.

Roof.

The roof was strongly designed with the main cross ties made of two 6 in. by 3 in. channels back to back, for carrying the band conveyor. The roof is covered by 24 in. by 12 in. Welsh blue slates fastened by lead nails, 5½ in. long, to 2¾ in. by 2¾ in. by ¼ in. angle-iron purlins. In order to provide adequate lighting for the revivifying floor, it was decided to have stretches of roof lights for practically the full length on each side of the apex. These consist of strips of ¼ in. thick rolled glass 5 ft. long, flashed over at the ends with lead in the usual manner.

Oxide Handling.

Each purifier is fitted with four bottom discharge outlet shoots 16 in. diameter, and the oxide is shovelled through these shoots into wagons. Four wagons are dealt with at one shunt by the works locomotive. The railway sidings under the purifiers have a fall of 6 in. from the far end, so that the empty wagons can be easily placed in position by the men, and also the full wagons placed in position for the locomotive without danger.

Sufficient wagons are provided to take the whole of the oxide from one purifier (approximately 90 tons). The full wagons are shunted into a special siding, and allowed to stand in the open for five or six days. Iron rods or pipes are thrust into the oxide, and these are tried each day to ascertain that there is no heating of the oxide. When all danger of spontaneous combustion is past, the oxide is discharged into the receiving hopper, and regulated by a jigging feeder into a primary breaker. This consists of two sets of cast-steel rolls (of same pattern as coal breakers), which crush the oxide into 4 in. cubes before passing to the disintegrator. The oxide in turn is delivered into a 12 in. enclosed elevator, with buckets (serrated edge) of the same design as the coal elevator (previously described), and one strand of No. 600 "Leys" bushed chain. This elevator delivers the oxide direct on to a 20-in. troughed band conveyor, extending the full length of the revivifying floor, or down a by-pass shoot into wagons placed on the opposite side of the receiving hopper.

Finally the oxide is delivered on to the revivifying floor by means of an automatic throw-off carriage with bifurcated shoot, which can be operated between any two desired points by means of a double clutch lever coming in contact with stops fixed on to the conveyor framework. The oxide, after being

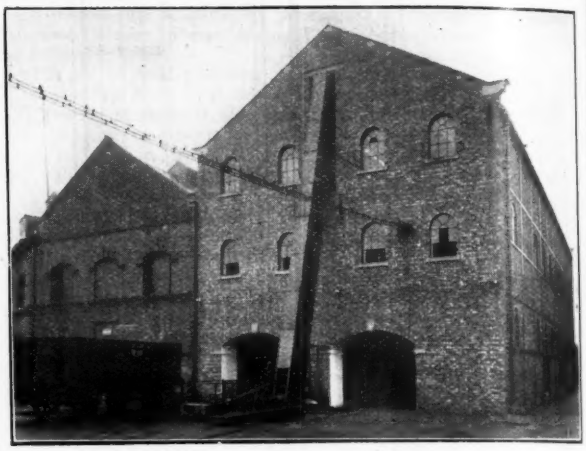


Fig. 11.—New Purifier House, showing Oxide Handling Plant, &c.

deposited in two heaps parallel with the band conveyor, is spread out by hand for final revivification. Prior to filling a purifier, the oxide is collected together by means of side-tipping bogies laid on portable 24 in. gauge rails.

The oxide breaking plant is driven by a 45-h.p. "A.C." motor placed on the ground near the receiving hopper, as shown on photograph fig. 11, which was taken on completion of the work. The elevator, band conveyor, and throw-off carriage are driven by a 16-h.p. "A.C." motor placed above the revivifying floor near the elevator head.

The crude gas is passed direct from the scrubbers into the new portion of the purifying plant, and the bulk of the sulphuretted hydrogen is absorbed before going to the old sets of purifiers, which act as catch boxes.

Comparative Costs.

The following tabulated statement shows the comparative cost of operating the existing and new purifying plant:

—	Existing Purifiers, 1920-21.	New Purifiers, 1924-25.
Annual make	528 millions	568 millions
Number of purifiers changed	12	13
Man hours for emptying and refilling	289	168
Oxide per box	55 tons	90 tons
Oxide handled per man per hour	0·38 ,,	1·07 ,,
Cost of purification per 1000 c.ft. over twelve months' working—		
Wages	0·241d.	0·209d.
Electricity	0·052d.	0·014d.
	0·293d.	0·223d.

Reduction in cost per 1000 c.ft., 23·89 p.ct.

The actual cost of wages in 1920-21 has been altered to the same rate as for 1924-25 for the purpose of accurate comparison.

In conclusion, while endeavouring to give as detailed a description as will prove of general interest of the reconstruction of the carbonizing and purifying plants at the Stockton Gas-Works, I hope that the observations I have made regarding the further improvements which experience in working has suggested will prove helpful to those who may be entrusted with similar schemes.

I wish to place on record the assistance I have received from the various members of my staff in preparing this address.

The President Thanked.

Mr. H. Lees (Hexham) proposed a vote of thanks to the President for his address. It was not given to every engineer, he said, to have the opportunity of carrying out reconstruction work such as Mr. Atley had undertaken during his five years' management at Stockton, and indeed he was not sure that every engineer asked for it. [Laughter.] It was reconstructional work such as Mr. Atley had undertaken that brought out the true qualities of an engineer. He was to be congratulated upon the excellence of the results. To have reduced his working costs as he had done was something of which to be proud; in fact, what Mr. Atley had done at Stockton would compare favourably with anything any of their members had ever done. The

Corporation should be proud of having a manager with Mr. Atley's capabilities, and as managers themselves they offered to him their hearty congratulations. They were thankful to him for his able address, and hoped he would long be spared to fill a useful place in the gas industry.

Mr. C. F. BLINCOE (Middlesbrough) seconded, and the motion was carried with acclamation.

The PRESIDENT acknowledged the vote.

Mr. A. H. MIDDLETON then read a paper entitled "Refractory Materials in Carbonizing Practice," which follows hereafter.

REFRACTORY MATERIALS IN CARBONIZING PRACTICE.

By A. H. MIDDLETON, of the Consett Iron Company, Ltd.

[The author points in no uncertain manner to the advantages of silica for the construction of retort settings. The practical working of a 60-oven battery at the Fell Coke Works is outlined in support of his argument.]

This paper is the outcome of the visit your Association paid in the summer to our Silica Brickworks, Fireclay Works, and Fell Coke Works, at Consett. We had intended, as the visitors walked round our works and laboratories, to point out, and give some description of, the characteristic features of the three types of refractories used in carbonizing practice at gas-works and coke works: Fireclay; semi-silica, or half ganister; and silica. As it was found impossible with so many members present to explain fully the various points of interest to the different groups as we were walking round, your President kindly invited me to make the remarks I then would have made in a paper to be delivered at your autumn meeting. I have also with me some of the test-pieces, &c., that were displayed in the laboratory for the inspection of the members at the time of your visit, which help to show the difference between the classes of refractory materials under consideration. I propose, therefore, to outline briefly some of the chief characteristics of the refractories mentioned which have to be taken into consideration when determining which of them is to be used in any particular place or service; the choice depending, of course, on conditions of temperature, load or pressure, &c., prevailing at the point under consideration.

FIRECLAY.

Fireclay is the cheapest of the refractory materials available, and on this score will, of course, be used whenever conditions permit. It is a material made from naturally-occurring clays, with a silica content of 50 to 65 p.ct., and alumina 40 to 27 p.ct. Of the three materials under review, fireclay possibly will better withstand rapid variations in heat at comparatively low temperatures, but it is unsuitable for the hotter parts of the settings owing to its inability to withstand high temperatures under load. This fact is not always correctly understood, and users are sometimes misled when refractory tests on fireclay material are quoted. A very good fireclay has a fusion point, or refractoriness, of Cone 31 to 32, or 1700° to 1710° C., which is within ten degrees or so of silica. This fact has led users to suppose that fireclay could withstand almost as high working temperatures as silica. Although a good fireclay may only melt at about 1700° C., under heat and constructional loads it begins to contract, soften, and lose shape many hundred degrees below this point.

The usual refractory test of a fireclay sample is carried out on a small cone of the material about 1½ in. in height, and the fusion temperature is that temperature at which this cone will not keep shape—*i.e.*, when its viscosity is so much reduced that the cone collapses, being unable to support even its own weight. It will be easily understood, therefore, that this deformation will occur, and does occur, at very much lower temperatures when the material is subjected to stresses—such, for instance, as occur under normal gas-works conditions. In the laboratory test for refractoriness under load, the sample is under heat for about three hours, and at top heat for only fifteen minutes, and weakening usually begins with the best fireclays when a temperature of about 1400° C., or lower, is attained. Experience has shown, however, that in actual practice softening and distortion occur if the fireclay is exposed to even considerably lower temperatures for longer periods. This material may often be satisfactory in those parts of the construction where the temperature is high, if only one surface is exposed to heat, and just the skin, as it were, subjected to the full heat conditions. This is a very different matter, and one often lost sight of, from that experienced when a body has two or more sides exposed to the effects of heat. One would expect from this—what, indeed, is well established—that fireclay is suitable for the construction of the shell of a setting, and is probably the best material for retort ends and the recuperator portions of gas bench construction.

Failures due to softening of fireclay over a long temperature range, even where only moderately high temperatures were reached, probably led to the introduction of the next refractory on our list.

SEMI-SILICA, OR HALF GANISTER.

In certain respects, this is mid-way between fireclay and silica, having a higher silica content (up to 84 p.ct.) than the material described previously. Material containing this higher percentage of silica occurs naturally, or is obtained by adding ganister to ordinary fireclay.

The fusion test of these mixtures is lower than either of its constituents, which is usual in cases of such mixtures, and depends roughly on the relative proportions of silica and alumina present; but it does not usually commence to distort under heat and load conditions at such a low temperature as fireclay—*i.e.*, the softening does not commence at such a low temperature as with fireclay. Nevertheless, final collapse occurs at similar temperatures. In other words, the tendency to soften at the lowest range of temperature is removed by the addition of silica. Complete collapse of the best of such mixtures will occur at just over 1400° C., which leaves no margin of safety under the temperatures now considered desirable in modern gas-works and coke-works practice. At first sight, this refractoriness may appear good enough; and it might be, but for the fact that it is impossible under working conditions to avoid peak temperatures being reached some time or other which are well outside the capabilities of this material. Even a short period of (say) two hours only a very little above the normal temperature may result in considerable damage.

No doubt many of you know to your cost, or have heard of, the failure of settings built of first-class semi-silica material, owing to temperatures somewhat higher than normal being reached occasionally, due to accident or when the beds have been pushed a bit, owing to shortage of plant or to meet abnormal winter demands for gas. The desirable margin of safety to meet all these conditions can only be obtained by the adoption of the third refractory under our consideration.

SILICA.

Silica refractories are now rapidly gaining favour in this country. In evidence of this, I might mention here that the Consett Iron Company have supplied silica material to over forty separate gas-making concerns in the short time since they decided to adopt silica as the material for their own extensions to carbonizing plant.

This refractory material is manufactured from a certain type of hard quartzite, or ganister, containing about 98 p.ct. of silica, which is ground down, and a small quantity of fluxing agent used as a bond. Those of you who visited our works will be more or less familiar with the process, so I need not elaborate here. The finished product consists essentially of a conglomeration of silica fragments set in a matrix composed of silica and the fluxing agent. Thus, its composition is more heterogeneous than fireclay compounds, and it exhibits marked differences in its behaviour when heated. Its fusion point, unloaded, determined as previously described, is approximately 1720° C. (Cone 32 to 33); but a piece heated to this temperature shows only a fusion of the matrix, the fragments of silica remaining unaltered. When a high-quality silica brick or retort tile is heated under load, no softening or distortion occurs until a temperature of at least 1670° C. is reached. No period of softening over a wide temperature range occurs, as with fireclay or semi-silica, and absolute rigidity is maintained right up to the point of collapse, which point is nearly 300° higher than that at which it is safe to use the other refractories for gas retorts, settings, or coke-oven walls. This characteristic alone should warrant the adoption of silica in all carbonizing plants worked at modern temperatures. No matter how gas making structures are overworked, there is always a large margin of safety; and it is safe to say it is extremely unlikely that a silica setting can be burnt-down under any gas-works conditions. I am sure the sense of security that is given by its use will appeal very strongly to all of you, and I feel convinced that for these services silica will soon entirely displace the other refractories in this country, in the same way as it has done in America, and is rapidly doing on the Continent.

Another advantage of equal importance which follows from the use of silica is the greatly increased throughput that can be obtained, due to its better conductivity and the higher temperatures that its use makes possible, without risk of damage due to overheating. In order to illustrate this, I will quote you some figures from the records of two of our coke works. The first of the following tables is a comparison of results obtained from two of our coke-oven plants, using the same class of coal. In one case, the walls of the ovens are built of silica, and in the other of semi-silica or half ganister. In the second table, the comparison is made between the carbonizing times at the first plant mentioned above, all conditions being similar, except the temperature at which the plant was being worked.

As the widths of the ovens compared in Table I. are different, I have shown the rate of heat penetration into the coal in inches per hour. If we compare this with the temperatures, it will be seen that for an increase of only 50°, from 1320° to 1370° C., the rate of heat penetration goes up from 13/32 in. to

Table I.

Type of Refractory.	Coking Time.	Mean Width of Walls.	Penetration of Heat per In. per Hour.	Temperature at Point of Combustion.
	Hours.	Inches.	Inches.	° C.
Semi-silica .	26	21	13/32	1320
Silica . . .	15	17¾	1/16	1370

Table II.

Average Flue Temperature.	Carbonizing Time.
1375° C.	15 hours 30 mins.
1330° C.	20 hours 17 mins.
1100° C.	30 hours 0 mins.

19/32 in. per hour—an increase of 46·1 p.ct. This would represent a similar increase in throughput, or reduction in carbonizing time, if the ovens had been of equal width. This big increase of 46·1 p.ct. is greater than can be accounted for by the increase in temperature alone.

The figures in Table II. suggest that the increased temperature would account for a 30 p.ct. increase in output, or reduction in carbonizing time. The other 16·1 p.ct. is probably the amount which is due to the better conductivity of silica over the semi-silica or half ganister.

The conclusion I draw from a consideration of the data in these tables, and from my experience in working with different temperatures at the coke ovens where the information was obtained, is that, by using silica in place of semi-silica, the throughput of a carbonizing plant may be increased by almost 50 p.ct. The improvement in output, due to working at increased temperatures, is undoubtedly to be credited to the use of silica, because we could not have worked with the higher heats at the plant where the walls are built of semi-silica. We were at 1330° C. already working as high as we could safely go, for, as I have mentioned before, to maintain an average temperature of 1330° C. means working at a much higher temperature at some parts of the construction, maybe for long periods. As a matter of fact, in the temperatures which gave an average of 1330° C. were a few which were over 1400° C.

Further instances can be given by users of silica retorts in this country; and perhaps some of you present will during the discussion be able to give us actual figures of the reduction in carbonizing time that has come under your own notice.

A characteristic of silica that is still not fully understood by some users is its expansion. This is not at all to be wondered at, as most silica brick makers were apparently equally in the dark until three or four years ago. The unsuccessful results attending the earlier attempts to use silica were almost entirely due to troubles caused by excessive expansion at working temperatures. The greater part of this trouble was due to incorrect methods of manufacture by the brick maker; and was contributed to by the user not making suitable allowances for expansion. There need be no trouble whatever from these causes to-day.

Silica is subject to two expansions—that known as permanent expansion; and thermal, or reversible, expansion.

Permanent Expansion.

The occurrence or non-occurrence of this depends solely upon the time and temperatures attained by the manufacturer during the burning process in the kiln. If the material is properly made, this expansion does not exist, as far as the user is concerned. The unburned, or green, brick consists solely of silica in its most dense form—quartz (sp.gr., 2·65). On heating to temperatures above 870° C., the quartz undergoes molecular change to the less dense forms—cristobalite (sp.gr., 2·33) and tridymite (sp.gr., 2·28). Though the transition temperature of quartz is 870° C., it must not be concluded that the change is rapid at this point. In brickworks kilns a much higher temperature must be attained in order to accelerate the conversion, so that the time taken is within the limits of commercial possibility. The consequent heavy expenditure of fuel in producing well-converted bricks is one of the contributory factors towards the extra cost of silica over fireclay refractories.

If silica bricks are properly burned, the whole of the quartz is converted, and no further expansion from this cause need be expected. It should be understood here that this expansion is not reversible, and that, on cooling, the bricks still contain cristobalite and tridymite, which do not revert to quartz. With an improperly-burned brick—*i.e.*, one which still contains silica in the form of quartz—further conversion takes place on heating above 870° C., owing to the instability of quartz above this temperature. This results in a growth of the brick until transformation of the quartz is complete.

The earlier failures, previously referred to, were undoubtedly the result of using improperly-burnt bricks, which continued to grow in use until fractures of the materials, or distortion such as made the construction unusable, took place. A simple specific gravity test on a sample of the powdered material gives a good indication of the amount of conversion obtained by the brick maker during manufacture. We understand that this test is to be incorporated in the Gas Engineers' Specification.

Thermal Expansion.

In addition to the permanent expansion just described, there is the ordinary thermal expansion, which is reversible, and common to practically everything. In silica this amounts to about 1·3 p.ct., as compared with about 0·75 p.ct. in fireclay. In silica this expansion is the composite effect of the changes in volume on heating of the three forms of silica present—viz., quartz, cristobalite, and tridymite; the greater part of the expansion of the latter two being complete at 300° C., and quartz at about 575° C. Of course, in well-burned silica the quartz is wholly converted, and the expansion curve assumes a form governed by the amount of cristobalite and tridymite present. The curve shown by the continuous line in the diagram is typical of many expansion tests made in our laboratory. It is interesting to note that we have had practical confirmation of the accuracy of these tests by measurements taken on the Fell ovens during the heating-up, shown by the thick line on the chart, and it will be noted the expansion was almost complete at 600° C. When due allowance is made for the joints in the structure, the curve plotted from measurements at the Fell is in agreement with the curve resulting from measurements taken during tests on single bricks heated in the laboratory furnace.

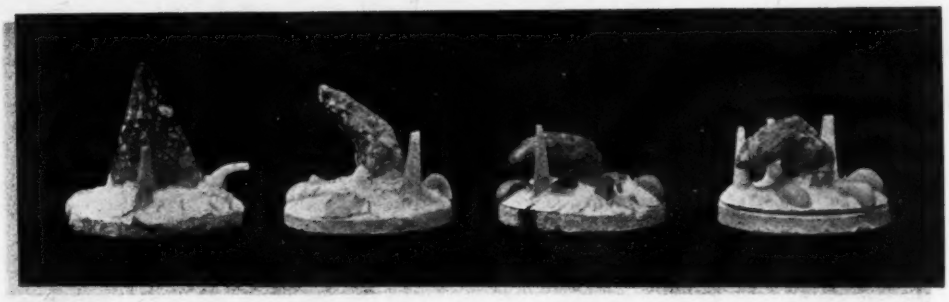
This 60-oven battery measures 222 ft. by 40 ft. by 17 ft. high. It was heated-up and put into operation without the slightest damage; not a single brick in the whole structure spalled or was crushed. The oven walls, 40 ft. long, were built-up tight; provision being made for expansion by means of adjustable buckstays. The walls increased in length 3¼ in. at each end, as was expected, and no increase has been observed during the subsequent 18 months' working. The expansion along the length of the 60 ovens, 222 ft., was absorbed by expansion joints filled with sawdust and pitch in the roof and sole of each oven. External movement in this direction was made impossible by the erection of concrete pinion walls. The expansion joints functioned perfectly, and there is still not a crushed, spalled, chipped, or broken brick in the whole of the ovens, so far as we can see. You will remember I pointed out to your members on the occasion of their visit how regular the expansion had been, as proved by the perfect alignment of the 61 buckstays at either side of the battery.

I do not apologize for continuing to emphasize to a meeting of gas engineers this performance at a coke-oven plant, because it follows that if this huge block of silica construction can be heated up, kept in perfect alignment, and worked under varying temperature conditions, without damage to a single brick, there is absolutely no reason why similar results should not be obtained in gas-works constructions. If spalling and crushing do occur, it is not the fault of the silica, but of design and/or workmanship.

Referring again to the diagram, the dotted line represents the expansion curve of an improperly-burnt brick—*i.e.*, one containing a fair amount of unconverted quartz. This quartz has the effect of slightly reducing the rate of expansion at lower temperatures; but since quartz is unstable above 870° C., the lower expansion due to conversion (permanent expansion or after-growth) is added to the ordinary thermal expansion, as expressed in the curve by the sudden increase in volume becoming evident at about 1000° C. This expansion should have been obtained in the kiln by the brick maker. The use of under-burnt material, with the consequent expansion, is a frequent cause of what is often wrongly called "spalling;" it is really a splintering of the brick due to crushing strains.

The thermal expansion, as distinct from the above, is accurately known, and though this expansion will, if not properly accommodated, introduce compression strains with results similar to those just mentioned, it is nevertheless a fairly simple matter so to build carbonizing chambers that not the slightest trouble need be experienced during heating-up and the subsequent working. It must not be forgotten that expansion must be looked after in width and height as well as length—in fact, in every direction. You may think this is too obvious to need remark, but our experience shows that it is not; nor, when leaving expansion joints, is it of any use to space carefully bricks and shapes, and then allow the spaces to be filled up with incompressible material. Expansion troubles are frequently due to carelessness in this respect.

The fact that the thermal expansion of a silica construction is nearly complete at 600° C. is often lost sight of during heating-up. When drying-out and heating-up a setting, it is essential that every care be taken in the earlier stages—*i.e.*, before the structure becomes red (about 600° C.). As silica is more sensitive to the effects of heat at the lower temperatures than either fireclay or semi-silica, where the total expansion is less and is spread over a wider range of temperature, it is imperative then that the rate of heating-up to 600° C. should be slow, and should also be sufficiently well controlled to ensure even temperature throughout—otherwise local expansion due to high skin heats causes cracking of the brick faces, correctly termed "spalling." While it is important that the operation of heating-up from cold should receive careful attention, it must not be inferred that silica is super-sensitive. Silica



A. B. C. D.

PLATE I.

A. B. C. D.

PLATE II.

settings can be, and have been, let-down and heated-up as demanded by works routine, and stand this treatment as well as settings built of either fireclay or semi-silica.

Another advantage of silica which contributes to the more efficient performance of retorts built thereof is that closer limits of accuracy can be attained in the manufacture of shapes, and a better standard of uniformity is maintained than is the case with the other refractories mentioned in this paper. Assuming that every care is taken to grind, mould, and dry the material, silica can be burnt in the kiln to the definite limit of its constitutional changes. Slight variations in kiln temperature cause no variation in the size of the goods, when full growth has been attained. On the contrary, fireclay and semi-silica materials undergo a permanent contraction which is entirely dependent on the temperature of the burning, and will continue on every subsequent re-heating. The closer accuracy and better shape of silica enables a structure to be built with a minimum of cutting and chipping (in many cases, without cutting a single shape), with a consequent saving in the cost of the erection.

Jointing Material.

I am afraid it often happens that insufficient attention is given to this important point—too many users and builders consider only one quality in selecting their jointing materi', that of cheapness. If you use an unsuitable jointing material, you are inviting trouble, and you will most likely get it. In fireclay constructions, the natural and probably the best thing to use is a ground fireclay similar to that of which the bricks are made; but though it may be suitable in certain cases as a jointing material for silica, it is unsatisfactory at the highest temperatures, as it has a lower fusion point than the adjacent silica, and in melting is liable to cause it to flux. Another possible joint is a mixture of ganister and fireclay; but it is difficult to get a mixture of this kind with a high enough refractoriness, and it will not form an adhesive solid joint unless the proportion of fireclay is high. Ground ganister might be used for this purpose, but on heating-up the structure conversion will take place on the lines earlier explained, and unless suitable allowances have been made, the extra expansion due to the conversion of the quartz in the joints will produce results similar to those consequent on the use of under-burnt material. There is no question that ground ganister can be used successfully as a jointing material when its properties are fully understood, and necessary precautions are taken; but its use is not without serious risks in the hands of inexperienced builders.

The importance of jointing material is perhaps more appreciated in America, where silica has been much more extensively used than it has over here. All the important American coke-oven and gas-plant builders I have met have told me of

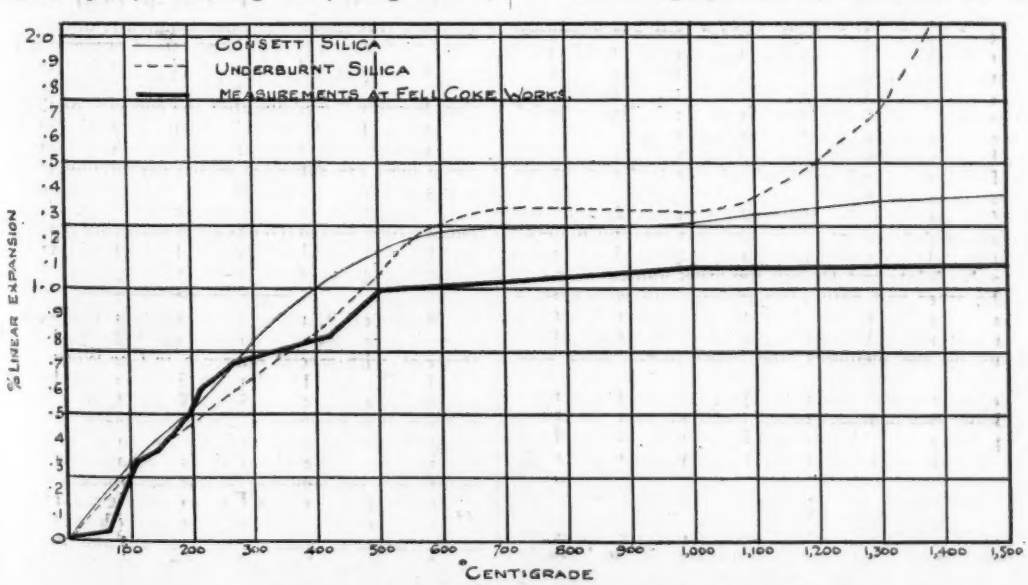


PLATE III.—EXPANSION CURVES REFERRED TO IN TEXT.

I. II. III.

PLATE IV.

serious failures in the past, directly attributable to the use of bad jointing material, even though the silica blocks were of a satisfactory quality. So particular are they on this point that the Wilputte Corporation persuaded us to go to the expense of importing from America special jointing material for use during the building of our Fell Coke Works. We used this imported material in some of the walls, and a carefully prepared material of our own in the remainder; both were equally successful.

To be perfectly satisfactory, the jointing cement must have a refractoriness comparable with that of silica, and give an adhesive joint without cracks. To do this it is necessary that it should be so compounded as to expand and contract on heating and cooling with the silica material with which it is in contact—otherwise it will not adhere satisfactorily, but will crack and allow leakage. I have here for your inspection some silica splits which have been jointed and burnt, and which illustrate what I mean. These have been photographed, and are shown in Plate IV. It will be observed that Specimen I., jointed with fireclay, burnt, and broken apart, shows cracks due to the differing behaviour of the two materials under heat. Specimen II., jointed with the specially-compounded cement mentioned previously, and treated as the other specimen, shows a good adhesive joint without any cracks whatsoever, proving that it expands and contracts exactly with the silica.

Description of Plate I.—This illustrates fusion tests made on cone-shaped pieces of the three materials we have had under consideration. A is a silica cone which has been heated up to 1690° C. (Cone 31), and shows no sign of fusion. B is a silica cone which was subjected to increasing temperature, and bent at 1720° C. (Cone 32 to 33), the fusion point; note the matrix is fluxed to a glass containing unfused silica fragments C and D show results of fusion tests on fireclay and semi-silica cones respectively, the cones bending at 1690° C. (Cone 31) in the case of the fireclay, and at 1670° C. (Cone 30) for the semi-silica. The cones are completely vitrified.

Plate II. shows test blocks of silica, fireclay, and semi-silica which have been heated to the point of collapse under a load of 50 lbs. per sq. in. A is a silica block which was heated to 1670° C. before disruption occurred. Note that a clean diagonal shearing characterizes the collapse, and the matrix shows as a spongy mass containing unmelted fragments of silica. B is a fireclay block, after similar treatment, but squatted at a temperature of 1420°. It is badly bulged, but not disrupted; and but for the fact that the load was removed at this point to avoid unnecessary damage to the testing furnace, the block would have been pressed flat in the course of a few seconds. C is the result of a similar test made on semi-silica material. The collapse occurring at 1420° C. resembles that of the fireclay, though there is some splitting of the block rather like that of silica. D is an unused test block of standard size, shown for purposes of comparison.

Plate IV. illustrates the difference between fireclay and specially-compounded cement when used as a jointing material for silica brick. I. shows a joint made with special cement; III. is a fireclay joint; and II. half the brick jointed with fireclay, and the other half with silica cement. In each case, a sandwich was made with the jointing material and burned, and for the purposes of the photograph and for the inspection of the joints by the members, the upper bricks have been removed.

I cannot close without expressing my indebtedness to Messrs Boot and Bride, two members of my staff, for their assistance in preparing this paper. I trust it will prove of some help in the better understanding of the now very important silica refractory.

Discussion.

Mr. F. P. TARRATT (Newcastle) appreciated very much the points brought forward by Mr. Middleton. They were glad to know he had come so much to the front in recent years in giving the benefit of his experience to the country respecting the manufacture of silica bricks. He was one of those pioneers of not only putting down an excellent coke plant of silica bricks, but actually manufacturing the material itself. Mr. Middleton had visited many works in different countries before arriving at the conclusions he had given them. After referring to the capacity of retorts and the conductivity of silica, Mr. Tarratt proposed a vote of thanks to Mr. Middleton for his paper and for the frank way in which he had dealt with his subject.

Mr. J. BAGSHAWE (Sunderland) seconded, and it was enthusiastically carried.

The PRESIDENT, speaking on the question of thermal expansion, said it was his experience that great care should be taken in heating-up new material in their retorts, and that it was wise to draw the dampers from the opposite side of the furnaces and so bring the heat across the retort. They put in coke gradually until the furnace was full, and up to that period there was no primary or secondary air allowed to enter the furnace.

Messrs. W. Walker (Wallsend), T. Kelly (Bridlington), D. Drury (Sunderland), J. Currie (South Shields), and J. Shadbolt (South Bank), also expressed their appreciation of Mr. Middleton's paper, and referred to one or two points contained therein.

Mr. MIDDLETON, in reply, said the higher conductivity of silica as compared with fireclay refractory was the chief point raised. It had been the subject of a lot of discussion, of thought, and experiment for a long time, and he would be the last to say that anything like conclusive results had yet been obtained; but the outlook both in the laboratory and in practice was in favour of silica being a considerably better conductor than either of the other refractories. Laboratory experiments up to a temperature below 1000° C. had not shown that it was better, but above that there was proof that it was a better conductor. They all knew how difficult it was to draw comparisons between results obtained under different conditions and at different times, because so many unknown factors might come in. But they took very complete and accurate temperatures every day at his firm's plant, and were careful to keep all available data.

Steel Treating with Gas.

The first vertical gas-fired carburizing machine installed in Chicago is now in operation at one of the city's largest printing press manufacturing establishments. This Company make the highest grade printing machinery available; and one of the principal parts is a shaft 3 or 4 in. in diameter and 3 or 4 ft. in length. That portion of the shaft which rotates in the bearings must be " glass " hard; while the remaining parts of the shaft must be of ordinary soft steel which can easily be machined. Mr. Robert G. Guthrie, Chief Metallurgist of the People's Gas Light and Coke Company, of Chicago, was called upon to design a furnace that would properly harden these big pieces of steel; and, with the aid of the American Gas Furnace Company, he was successful. The " American Gas Association Monthly " explains that the capacity of this great furnace is three shafts per day. The shafts are prepared and put into the machine in such a way that only those parts intended to be made hard are subjected to the carburizing action. The process starts about 9.30 o'clock in the morning, and continues all day. The next morning the furnace is again brought up to temperature, and at 9 o'clock the shafts are removed, and immediately immersed in a huge vat of ice-cold water. Thus the hardening operation is completed.

Mechanical Handling of Material in Gas-Works.—An informative paper on the subject of " Mechanical Handling of Material, with special reference to Gas-Works Practice," was read by Mr. W. H. Johns, of Swansea, at the opening meeting of the session of the South Wales Branch of the Institution of Mechanical Engineers. In the first place, the author explained briefly the manufacture of gas by the destructive distillation of coal, and enumerated various mechanical aids to gas manufacture and the handling of the bye-products of carbonization. A comparison was made between original and modern gas-works equipment; and the paper was illustrated by a series of lantern slides of machinery, both old and modern, including the plant erected during the years 1923 and 1924 at the Swansea Gas Light Company's complete new works at Morriston, which has already been fully described in the " JOURNAL."

BRITISH COMMERCIAL GAS ASSOCIATION.

FOURTEENTH ANNUAL CONFERENCE, PLYMOUTH.

PRESIDENTIAL ADDRESS of MR. J. H. ELLIS, Chairman of the Plymouth and Stonehouse Gas & Coke Company.

(A full report of the proceedings will be given next week.)

[The President makes a strong appeal to non-members of the Association to join "the team." He deprecates the subsidizing of coal and of the gas industry's competitors, low-temperature carbonization, and electricity. Relief of taxation is better than any form of sudsidy. The cases for tar on roads and for gas as an aid to health are ably put forward.]

In holding its meeting in the West of England, the British Commercial Gas Association does honour to this favoured part of the country, and pays its customary regard to the fitness of things. For was it not in Cornwall that Murdoch's discovery gave birth to our industry, which, after a century of useful existence, now extends throughout the world and sheds its benefits on millions of mankind?

The part which the British Commercial Gas Association has taken in the fourteen years of its active life in bringing home to the people of these Islands and of this Empire what these benefits are, is known to you all. I shall not even attempt to do justice to its work. That task was done so well and so thoroughly by my immediate predecessor, Mr. Wade Deacon, at Liverpool last year, that nothing—or at least very little—is left for me to say. But full and clear as Mr. Wade Deacon's address was, a word or two must be said of the work the Association has accomplished under the guidance of your friend and mine, Mr. Goodenough, its Executive Chairman, partly to refresh the memories of its supporters, but mainly for the ear of those (happily a steadily diminishing number) who have not yet been persuaded of the value of that work, and so have not contributed to its cost on the generally accepted basis.

An Appeal for Solidarity and Unity.

On this last-mentioned point, may I put in a word for that in which I am a great believer—namely, team work? The essence of team work is, of course, the acceptance of common aims, the selection of common leaders, and then loyalty to both, unstinted support for both, unless and until they be changed by common consent. The gas industry is not yet completely united in organization for its common good. In the interests alike of those who are standing aloof and of those of us who have accepted our places in its teams, and are working for and with them, may I express the fervent hope that it may not be long before all are willing to make common cause in contending with the difficulties that lie before us?

Complete unanimity of opinion as to every detail of strategy and tactics can rarely, if ever, be attained in any co-operative campaign; and little would ever be achieved if nothing were done until everyone was agreed as to exactly what should be done and how it should be accomplished. Capacity for co-operation, governed by reasonable discussion, is, however, inherent in the British genus; and I therefore appeal with confidence to any who may be as yet standing aloof from the national organizations that are working for the general good of the gas industry—from its several teams, let me say, using a term entirely appropriate for them, for they are indeed inspired by the team spirit—not to let the best, from their point of view, be the enemy of the good as organized by the majority.

So far as this Association in particular is concerned, let me just say of its work that we who are its members can best appreciate its value by asking ourselves how we should regard a proposal for its discontinuance. The answer to that question should suffice to make clear to non-supporters the case for their future co-operation. There is a very true saying that "we do not value water till the well runs dry"—a saying that might with truth be modernized to run: "We do not value gas as we should if the supply gave out." I put it that way because our well never does run dry; the gas supply never does fail.

But supposing the "B.C.G.A." put up its shutters. Suppose there was no organization for designing, printing, and supplying to small undertakings in retail quantities at wholesale cost all kinds of publicity literature—posters, booklets, leaflets, calendars, postcards, and so forth—written and illustrated by experts. Suppose we had no organization to plan advertising campaigns for its members and supply them with the necessary copy; or with cookery demonstrators; or with first-class selling letters to consumers; or with ideas and material for showroom displays or for exhibits at local exhibitions.

Suppose there were no headquarters to enter the lists of controversy if need be, or to pass on to one member in difficulty the experience of others, or arrange for him to get expert advice on the spot; no organization to correct errors in publications dealing with matters affecting gas, or to supply correct information and well-prepared matter to such publications anxious to avoid error in advance; nobody to whom Fleet Street could come for interesting news or informative articles, or by whom they might be originated; no one to supply to lecturers and readers of papers on subjects of importance to the industry essential facts and figures and illustrations. Suppose there were no further issues of "A Thousand-and-One Uses for Gas;" that there was no one to finance research and propaganda by scientists and publicists interested in the hygienic aspect of gaseous fuel; that it was no one's business to keep in touch with those engaged in social service, public health, women's work, and education; that there was no one to represent the industry with authority in the world of journalism and publicity. Then imagine that there were no Salesmen's Circles; and no organized advocacy of service to the customer as the basis of all commercial progress. Finally—though I have doubtless left out many aspects of "B.C.G.A." activity—and by no means least, suppose there were no advertisements of gas in the national newspapers and periodicals, because no one gas undertaking, however large, could afford to take space in them.

Should we not feel the instant need and importance of creating an organization capable of performing these and other services for the industry, if the "B.C.G.A." ceased to perform them as now it does within the limits of its means? That being so, as I am sure you will all agree, need we have any hesitation in continuing to give that organization our full support, alike in its ordinary and in its special work on our behalf—and can any administrator of any gas undertaking refuse to join us in so doing? It is doubtless true that the larger undertakings do not need some of the services that are of so much value to the smaller; that, indeed, several of the larger undertakings give valued help to the smaller through the medium of the Association.

But surely that is no sufficient reason for any large undertaking to stand aloof. Even on the ground of self-interest, apart from any spirit of big brother helping little brother in one family, it is to the advantage of every undertaking that the customers of every other should get the very best quality of service, both technical and commercial; and that is where the larger undertaking gains by the existence of an organization for the assistance of the smaller.

Let me say, before leaving this point, that no one recognizes more clearly than I do that no organization in our industry, still less a member of it, has any right, and certainly none of us has any desire, to dictate to any board or committee what it should or should not do in this or any other matter of common interest. The support of every undertaking is, and must be, purely voluntary, and anyone is fully entitled to refuse to co-operate with the rest without incurring any shadow of reproach for so doing. Let that, if you please, be clearly understood by all who hear or may read my appeal for solidarity and unity in the industry. It is an appeal—based, it is true, on what I believe to be very cogent arguments; but it is nothing more. There is no thought of criticism or dictation behind it.

The Work of the Gas Industry.

The mission of our Association, as its name implies, is to help those in the gas industry to make it pay, and to pay in the widest and best sense of the word. That is to say, it must pay not merely the proprietors whose capital is invested in it, and those engaged in it and who depend on it for their living, but it must pay the country at large. The ways in which the country at large is paid are manifold, though they appear in no balance-sheet. To attempt to deal with them in the limits allowed me would be impossible. We pay the country by economizing its greatest material national asset, coal—by extracting from it those elements essential for the success of many of the country's industries and much of the light, heat, and power for keeping our homes and our factories going. In so doing we conserve the energies, add to the comfort, and improve the health of the population.

It is because the gas industry pays the nation as well as itself that it is now in a sounder, stronger, and better position than ever for public service. How has that position been won? Because those engaged in the industry have faith in it, founded on knowledge and enthusiasm for its success stimulated by high ideals. The research of the industry has won secret after secret from Nature for the use of man; and we look back with admiration and gratitude on its great men of the past who have placed us where we are, and who have established foundations on which the great men of the present, emulating the examples of their forerunners, are still building. It is

because of our steady pursuit of knowledge, passion for facts, boldness in experiments—scientific and commercial—that we are still growing from strength to strength, and are now advancing more rapidly than at any period of our existence.

Of late in some quarters the Government of the country has been urged to act before it has digested—I think before it has received—the reports of the scientific and able experts to whom it has entrusted certain important investigations. This reminds one of a tale told by the late Prof. Huxley. Once when in Ireland he hailed a jaunting car, and having got seated said to the driver; "I am in a tremendous hurry, drive as fast as you can." Before he could get out a word as to his destination, the Jarvie whipped up his horse and started off at a hard gallop. "Hi, driver, do you know where you are going?" exclaimed Huxley. "No, your Honour, but I'm driving fast." The lesson of that tale of enthusiasm and impulse due to imperfect knowledge is not necessary in the gas industry, which likes to know whither it is going before it drives ahead, but might well be taken to heart by some of our statesmen and politicians.

State of the Coal Industry.

And so let us look out for the difficulties and dangers with which we may be confronted, and let us face them now, as the industry always has faced its troubles, with resolution and courage. What are they? The first peril which threatens is common to every industry, and is largely beyond our control. It is the state of the coal industry. The stoppage threatened a few weeks since was temporarily avoided; but the settlement was effected by means condemned alike by the Government which proposed it, by the coalowners and miners who accepted it, and by the public at large—by means of a subsidy. In other words, the nation at large, against its better judgment, is made to pay the parties to the dispute for a few months' peace.

That the coalowners themselves disapproved of a subsidy is well known. That the Government itself disapproved of it is established by the following declaration, made in the House of Commons on its behalf by Sir Arthur Steel-Maitland. He said: "In view of the suggestion which is being made in the newspapers, I wish to make it quite clear that, while the Government do not close their minds to any proposals that might be put forward, no trade including the coal trade ought to look to the Government for a subsidy to enable it to carry on." And just a month afterwards Mr. Frank Hodges, one of the ablest, if not the ablest, of the Miners' leaders, in speaking of the subsidy, said: "It is unnatural, it is unhealthy for a great industry like the coal industry to be dependent on any other means than its own;" and he added: "If you continue the practice of subsidizing industry, that is a sure step in the direction of national bankruptcy."

From these declarations, it would seem that there is an agreement in principle between men of opposing parties which, coupled with the Chancellor of the Exchequer's difficulty in finding the money, gives ground for the belief that the temporarily easy, but wasteful, experiment of a subsidy will not be repeated. There let us leave the coal dispute for the moment, with the hope that when next May comes it will find the gas industry as prepared as it was in July to carry on the domestic service of the country, whatever the duration of the stoppage may be, as smoothly and efficiently as it did through the stoppage of 1921.

Subsidized Competition.

The lesser dangers that threaten are two. They both arise outside our industry, and are in no way due to shortcomings and weakness within; and, again, they threaten other industries than ours—indeed, they threaten industry at large and the country generally. I allude, of course, to suggested State aids or subsidized competition in two directions:

1.—Low-temperature carbonization.
2.—Electricity.

So far as I know, the attitude of the gas industry is—and it is certainly the attitude of the concern with which I have the honour to be associated—that we fear the competition of neither in a fair field. We in Plymouth, at any rate, extended our friendly aid to the first, and helped it to the utmost of our power. With the second we have lived in friendly rivalry and competition for more than a quarter-of-a-century, to the advantage of both and of the public as well; and it is with no small degree of pride I recall that I was primarily responsible for the introduction of a public supply of electricity into Plymouth, having, as adviser of the Corporation, recommended it, having obtained the needful parliamentary powers, having acquired the land, and having done the whole of the preliminary legal and clerical work attendant on the starting of the station.

Low-Temperature Carbonization.

A word or two about low-temperature carbonization. As I have said, we tried it, or rather allowed those interested in it to try it, under its then name of "Coalite," in our works here in Plymouth fifteen years ago. We gave them every facility, and were most anxious—as anxious as they were—that it should succeed. We took their gas at a mutually agreed fair figure. But the venture came to an end, and why? Because it did not pay. We were by no means alone in the gas industry in offering facilities for the trial of low-temperature carbonization on a commercial scale; but nowhere can I find that it has been made to pay.

Our chemists and analysts who continue to watch and examine their proceedings tell us the "Coalite" products cannot compete with ours for anything at all, roads included; and this was very clearly and cogently stated by that great authority on coal questions, Lord Gainford, a year ago in "The Times." Scientifically, doubtless, the Government will be fully advised by those conducting the investigations of the Fuel Research Board; but speaking as commercial men, we can commend to them Kipling's well-known lines in "The Sergeant's Marriage":

> "We know all about 'em,
> They have all to find."

Electricity.

Let me turn to electricity. Here is a horse of another colour. Electricity pays, and pays handsomely, when run on commercial lines. It has fields which are peculiarly its own. The dividends that large well-managed companies are allowed to pay are enormous as compared with the restrictions on interest which Parliament imposes on gas companies. I commend Mr. Milne Watson's recent exhaustive examination of the position to our legislators.

I would also invite them to read what the electrical engineers themselves say about the suggested subsidy. A Past-President of their Institution has declared it is not wanted; the Electrical Engineer of Leeds has torn the proposal to shreds. Some have suggested it would give farmers cheaper electricity; but the Chairman of an important Yorkshire Company and the Chester Electrical Engineer have shown the fallacy of that, and the latter adds he has no confidence that Government financial assistance would be advantageous. Those of us who, like myself, have the advantage of living in the country and enjoying the friendship of our most excellent neighbours, the farmers, and who have a life-long acquaintance with their operations, wishes, and needs, know that any subsidizing of a super-power station in this part of the world would be of no use to them; and for the simple reason that it would not pay.

The wisest and most far-seeing of electricity people fear the effect of subsidies, because they necessarily lead to that constantly increasing centralized bureaucratic interference which hampers local and individual initiative, and leads to waste and extravagance. It is as a citizen rather than as a gas administrator that I most fear subsidies. They increase the heavy load of taxation which presses us down, and by augmenting the huge Civil Service staff of the country they impair our freedom. Whence does the money for these subsidies come, but from the taxpayers as a whole? The collection is one operation, is it not? The tax collectors pay it into the Treasury, do they not? The Treasury pays it out to that section of the community which either persuades or blackmails the Government into parting with it. Now, here are three distinct operations, each necessitating book-keeping, audit, supervision, and so forth. Surely the simplest, fairest, and best way is to save the cost of all these operations, and do justice to all taxpayers alike by relief of taxation.

That is all that need be said of our threatened dangers, and we can leave them, consoling ourselves with the reflection that threatened men live long—especially if they are alive to their perils and active in countering them.

Our Business.

Now let us apply ourselves to those affairs we can and do control. Our business is to get the utmost that can be got out of coal, and not only to get out of it all there is in it, but to get it out in the most economical way; and not merely in the most economical way, but in such a way that the various operations shall cause no offence to the public and shall not impair the public health. Although we extract from the coal we carbonize more heat, whether in gas or in the heat-giving residuals, than is obtained by any other process, and although the value of our residuals after they have been dealt with by the distiller exceed the value of the coal itself, we are not even yet satisfied with the results. Proud of them we are, and justly so.

We are daily benefiting by the ceaseless scientific research work of Leeds University under the Livesey Professor, and by that of the great London Gas Companies, of the Birmingham Corporation, and others. Indeed, well nigh every gas undertaking but the very smallest has a laboratory of its own, and there much valuable and thorough work is done; while our friend and ally the Institution of Gas Engineers spend wisely and well the money we grant them in aid of their investigations. We cheerfully give them a twelfth of the income the gas industry derives from the subscriptions to the National Gas Council; but our other work makes heavy calls on our income, and it is all we can afford. I wish we could grant them more. I here pause to acknowledge with gratitude the costly, but highly successful, experimental and practical

work of our friends and allies the manufacturers of gas utensils and appliances—not merely fires, cookers, and domestic things of that kind, but numerous and varied articles of industrial use—for the high standard and the economy and efficiency they have attained, and to express the hope that our harmonious co-operation with them for the benefit of the public we serve may long continue.

The President of the National Gas Council, in his evidence before the Board of Trade a few months ago, and elsewhere, has so adequately dealt with the uses of our industry in peace and war, and has supported his statements with such an abundance of facts and figures, that I feel I should serve no good purpose by going over the ground again. Suffice it to say the felicity and force of his conclusion leaves nothing to be desired. He said: "The gas industry is the chief conservator of our first national asset, inasmuch as it applies the latent heat of the coal to practical purposes with greater efficiency than any other industry."

Value of Tar for Roads.

The value of its bye-products and the large interests—such as the aniline dye and other industries—dependent on them were set forth by him, and the great importance of tar and its compounds and derivatives, and the increasing demand for them in the tremendous development and improvement of our roads, are well known. While it would be idle to allege that in the heart of a great town, where the weight and volume of traffic are intense, tar is superior to several other materials, and while it would be equally foolish to deny the prejudicial effect it may have in certain fishery districts, it is beyond question true that for the great main roads of the country which serve high-speed motor traffic and general merchandise, and for subsidiary roads also, tar has no superior, if rightly and scientifically used.

We are prepared to submit it to any test, to any investigation which the Road Board or any department of the State may apply, and to place it in competition for price and durability with any foreign material. We ask no preferential treatment for it, except such as it may earn by its own merit; but we urge as strongly as we can that imported substances ought not to be favoured unless proved to be its superior. We submit that, subject to this condition, tar produced from our own raw material, coal, should be used, and the money kept in the country for the country's benefit, instead of being sent out of it for the purchase of other and (except for very limited uses) inferior and more costly foreign goods.

Gas as an Aid to Health.

Our value to industry as the suppliers of cheap light and power, and of a labour-saving, output-improving, convenient, reliable fuel is great; but no one could listen to Dr. Saleeby without feeling that our value to the health of the people and in their homes is greater still. As a commercial Association we are out to make our industry pay ourselves, of course; but it will not pay us unless we give good public service. And what public service is so beneficial as, or appeals to us with greater force than, helping to relieve our towns from the dirt which wastes our substance, impairs the beauty and accelerates the decay of our monuments and buildings, and, by shutting-out the sun, spreads disease and death among children and the weak and helpless?

In the home, and especially in the homes of the poorest of the poor, we lighten the burden of the wife and the mother by relieving her of the drudgery, unnecessary toil, and weight-lifting attendant on the use of raw coal, and so increase her vitality, especially at those anxious and critical times when her health and strength are essential for the benefit of children in being or to be, for her own well-being, the well-being of her home, and the well-being of our race. Those of us who have been engaged in the criminal law, and have had a share in the care of the bodily and mentally afflicted, and who had experience of Tribunal work during the war, realize the appalling waste of human life and energy due to strain on mothers and the weaklings produced in consequence. May I remind you in this connection that lunatics show a deficiency of stature of 1·96 in. and of weight of 10·3 lbs., and criminals 2·06 in. and 17·8 lbs.—indicating a deficiency of physical as well as mental stamina in both those deplorable classes of society?

Both before and after the birth of a child, good light, warm food, and heat instantly available at the bedside, all at modest cost, are boons of immense and frequently of incalculable benefit to mother and child alike. It is our job and our privilege to provide those boons in these emergencies, and at all times. And it is our privilege to provide them in such a way that the rays of Nature's vitalizer and healer, the sun, may reach every part of our towns, carrying with them those healthy conditions of country life which it is the aim of preventive medicine to secure. Ian Hay in his happy address to the students of Guy's said: "Doctors are the standing army and navy of humanity. The life of these men is one long campaign on behalf of the other people against ignorance and dirt and cruelty and disease." The advance guard of that noble force comprises the Medical Officers of Health of the country; and it is up to us by practice, precept, and example to work with them for clean and smokeless cities.

Sliding-Scale and Profit-Sharing.

And how may profit be attained without danger of the public being imposed on? In many ways. By the sliding-scale system of charge, by which the public pay us by results. We are many of us limited in respect of the dividends we can pay our shareholders to a specified rate of interest for a specified quantity and quality of heat charged for at a specified price. If we reduce the price, we can pay so much more dividend. That brings the interest of the public and the shareholders into line. But it leaves out to a certain extent the interest of the workers, in which I include the technical and clerical staff, as well as the works and fittings staff. We in Plymouth have followed other companies in applying the sliding-scale to the salaries and wages as well, so that employees' emoluments are increased by the same percentages as the proprietors' dividends when the price of gas goes down. It is thus to the interest of everyone in the team to give the public the best value for their money, to keep down cost, to keep up efficiency. The provision for superannuation releases them from anxiety in old age, so that their single aim and interest is the public good.

I have detained you at too great a length in reviewing the past and dealing with the present. You will hear in detail and from men of great distinction in different spheres, what more we may be able to do, and in which directions our thoughts and energies should flow. All we desire is our freedom to serve the country, its homes, and its industries in a fair field with no favour. We make no demands on the taxpayer; we stand on our own merits; we welcome all competitors; we know our limitations and theirs also—we can and do use them, they can and do use us—we are prepared to fight them if need be or to discuss or to negotiate with them, as time and circumstances may require, what is best for them and us and for the public interest, knowing full well that nothing will permanently pay us or our competitors which is disadvantageous to our customers and the country.

SCOTTISH JUNIOR GAS ASSOCIATION.

(EASTERN DISTRICT.)

The Opening Meeting of the twenty-second session of the Association was held at Edinburgh on Saturday, Oct. 10—Mr. R. L. Laing, the retiring President, in the chair.

Mr. Laing introduced Mr. A. McG. Clark, of Perth, the new President.

Mr. Clark thanked the members for the honour they had bestowed upon him. He then presented Mr. Laing with a gold medal as a memento of his term of office, also a gold albert in recognition of his valuable services as Hon. Secretary and Treasurer during a time when both the membership and the funds of the Association were very low.

Mr. Laing expressed his appreciation of the members' kindness. The work had been a pleasure, and was done without thought of reward. He thanked Mr. Farquhar, of Peebles, for the assistance he had given during this dull period.

The President reported that the Council had added to the list of Hon. Members the name of Mr. Moyes (Stirling), who had accepted the honour. Mr. Moyes was one of the first members of the Association. He then introduced Mr. W. B. McLusky, of Halifax, and voiced the appreciation of the Eastern District at being honoured with an address from him.

Mr. McLusky said it was a pleasure for him to be with the Association—a pleasure which was magnified when he saw Mr. Clark in the chair. He (the speaker) was at the Perth Gas-Works when Mr. Clark commenced his training there.

Mr. McLusky then delivered his address, entitled "Town Gas—Some Commonplace Remarks on Manufacture and Supply in Scotland," which was published in last week's issue of the "Journal," p. 100.

The President thanked Mr. McLusky for his address, and asked him to be good enough to carry the respects of the Scottish Junior Gas Association (Eastern District) to the Yorkshire Junior Gas Association.

Mr. McLusky then answered several questions. He pointed out that a discount was given to coal merchants who were regular buyers of coke; this discount being—for 100 tons, 15 p.ct.; 50 tons, 10 p.ct.; and 20 tons, 5 p.ct.

The President proposed a vote of thanks to Mr. McLusky, which was heartily accorded.

The members then adjourned, with their lady friends, to tea, after which a whist drive was held.

Northern Leicestershire Gas Company.—Regarding the criticisms in our columns of the prospectus of this Company, we learn that Lt.-Col. Sir Henry Blyth Hill, Bart., D.S.O., has vacated office as a Director of the concern.

WALES AND MONMOUTHSHIRE JUNIOR GAS ASSOCIATION.

Opening Meeting.

[The President, in his address, gives interesting information about the difficulties met with in abnormal conditions—a mountainous district honeycombed with mines. Main-testing by special meter and barring work are explained; also the precautions taken to cope with excessive tension or compression on the pipeline. He appeals for less self-effacement by the industry.]

The Association's first meeting of the session was held on Saturday, Oct. 10, in the Rhondda Valley. Mr. Octavius Thomas, Engineer and Manager to the Gas and Water Department of the Rhondda Urban District Council, met the members at the Ystrad Gas-Works, and, with Mr. J. Wood, Mr. H. Heath, and other members of his staff, conducted the party round the works.

Subsequently a meeting was held in the Council Chamber, Pentre. Mr. B. J. Bell (the President) took the chair, and was supported by Councillor W. S. Lane, J.P. (Chairman of the Rhondda Urban District Council), Mr. Octavius Thomas, and Mr. J. Stephenson (Gas Engineer and Manager at Ferndale).

Councillor Lane, welcoming the members, said he was very pleased to meet the Junior Gas Association, for, from what he had heard, they were performing good work, and their meetings added knowledge to those taking part in them. In the Rhondda they had such an efficient General Manager in Mr. Octavius Thomas that the Council were never worried—notwithstanding the many difficulties encountered through the nature of the area in which they had to work—in regard to gas matters. During his fifteen years' connection with the undertaking, he had never heard Mr. Thomas criticized. They had an electricity system also; but gas was holding its own very well, and personally he thought their commodity was by no means at the end of its tether.

Mr. Bell remarked that their Association were honoured by the presence of Councillor Lane, Mr. Octavius Thomas (concerning whom nothing they could say would be sufficiently complimentary for what he had done for the Association), Mr. Stephenson, and their other visitors. With regard to the Institution Education Scheme, it was of vital importance that they should realize the value of this. Up to the present the preponderance of entries had been on the manufacturing side. No diplomas had been gained on the supply side; but they felt proud that two of their members had gained diplomas in manufacture. He proposed a hearty vote of thanks to the Wales and Monmouthshire District Institution of Gas Engineers and Managers for the awards made, by way of books, to nine of their members for papers presented to the Association, and for examination results.

Mr. C. S. Bateman (Junior Vice-President) said it gave him great pleasure to second the President's proposition. Their Senior Institution was the only one up to the present to make a move of that kind to support the juniors.

The vote was carried with acclamation.

Mr. Bell, in calling upon the President-Elect, Mr. J. Wood, to take the chair, said Mr. Wood had at all times shown the keenest interest in the work of the Association.

Mr. Wood, who was very cordially received, said his first duty was to move a very hearty vote of thanks to Mr. Bell, not only for his services as President during the past year, but also for the interest and zeal he had displayed at all times in furthering the Association's cause. From every point of view Mr. Bell's work had been admirable; and he asked him to accept their certificate as a small token of esteem and appreciation.

Mr. T. A. Canning, seconding the vote, referred to Mr. Bell's activities in bringing the Association into being. As the first Secretary, he had guided the Association through its most difficult period. He had been an ideal President, and had given the Association a lead which would redound to its honour and dignity.

The Hon. Secretary (Mr. W. E. Crowley) supported the vote of thanks to Mr. Bell, and extended to him the Association's hearty congratulations upon his appointment as Hon. Secretary and Treasurer to the Joint Council of British Junior Gas Associations.

Mr. Bell, responding, pointed out that the endeavour had been to build their constitution in such a way that the humblest member could aspire to the chair. The welfare of the Association was in the hands of every member, and it was necessary therefore that all should take a keen interest in the work.

Mr. J. Wood then delivered the following

PRESIDENTIAL ADDRESS.

We are now entering on our fourth year of activities; and a review of our efforts up to the present will not be out of place. When one looks back on the work completed, and the ground covered, it is astonishing what can be achieved in so short a time. We have had some very interesting papers and addresses from gentlemen holding the highest and also the humblest positions in the industry and its allied professions. I do not wish to single-out any one paper above others; they have all been excellently delivered, and have been no less valued by our members. We have also visited several works of interest in South Wales and Monmouthshire. I think I can truthfully say these visits have been very highly appreciated by our members. I can speak from close personal experience of the Association's work; for I have only missed one visit up to the present, and have watched with very critical eyes, and noted how much interest was being displayed. I think this speaks volumes for a young Association like our own, and sincerely trust the same will be said in the future. Let me assure you that your Council have your goodwill at heart; that no stone will be left unturned to make the future meetings and visits at least as interesting and instructive as in the past. I should like to have a word with our young associates. As you are aware, we have decided to take young men under twenty-one years of age as associate members of our Association. I feel confident this, if properly carried out, will be a step in the right direction, and, of course, a great help to the younger generation.

You cannot do better than properly qualify yourselves for the future. I am well aware there are numerous diversions to attract your attention of an evening when your duties are done. I am no kill-joy; so do not think for one moment I wish to keep your nose to the grindstone all the time. Recreation is as essential to your well-being as work or study. One should go hand in hand with the other, but if you are determined to do well in your profession, you can do no better than adopt the Boy Scouts' motto: "Be Prepared," taken in its fullest sense. Never forget that a man becomes "able minded" just as he becomes "able bodied." A child in its infancy puzzles over "two *plus* four," but in time, as it grows and develops its brain power, all these things become simplicity itself. True, it has to go from step to step; there is no jumping from one extreme to the other.

Do not be afraid to ask a question at any meeting, should something be said that you do not thoroughly understand. We wish you to look at our organization as a kind of "Mutual Improvement Association." The more questions you ask, the more you enter into the discussions and our work, the more shall we appreciate it. Rest assured there is, and will be, plenty of scope in the gas industry for good men—men with brains, who know how to use them. I do not wish to pose as a prophet; but I can clearly see we are drifting more and more into specialization as time goes on. Men will be wanted as salesmen, distribution supers for gas supply service, as distinct from distribution, and others as publicity men. This will have to be recognized sooner or later, if we are to hold our own against our competitors.

There are other things I could mention, but will refrain from doing so, for fear of exceeding the bounds of this address. Before leaving this subject let me beg of you to take yourselves to task while you are young, and ask: "What can I excel in?" When you have decided the point, make yourself proficient in your department in every way. Do not become "a square peg in a round hole." To a certain extent man has his destiny in his own hands, so I would say to you: See that you work your destiny into its proper channel.

Leakages in the Rhondda.

This address would not be complete without some reference to gas leakages in the Rhondda. There is an old saying that gas profits are made in the retort house and maintained or lost in the distribution department. I am afraid we unavoidably lose considerable quantities of gas in its distribution; but, everything being governed by cause and effect, I will endeavour to outline the cause. The effect is well known.

In our area of supply there are about thirty mines working, from which millions of tons of coal and rubbish are taken annually. Some of these mines have been working nearly fifty years. You will readily see that, with the taking of this material out of the earth, subsidence naturally occurs; but this does not include all our difficulties. The mountains on either side of the valley are continually moving in, and causing us considerable trouble. It is not my intention to give figures showing the extent of ground subsidence during the last few years; you can obtain all this information by referring to Mr. Octavius Thomas's Presidential Address before the Wales and Monmouthshire District Institution [see "Journal" for Nov. 1, 1922, p. 306].

Our area of supply is quite different from that of the majority of towns, where you can get from one side to the other in very little time. From the river bridge in Hafod to Blaenrhondda is about 11 miles, and from the fork in the two valleys at Porth to the end of our district in the other valley is another 3 miles. We have also other lengths or offsets running at various angles up vales from the main valleys. You will obtain a better idea of my meaning by looking at the Ordnance Map. Our main mileage is about 76, ranging from 15 in. to 2 in.—I am pleased to say we have very little 2 in. There are also over 50 miles of services, so you will realize that we have plenty on our hands.

Before proceeding further, I think I cannot do better than give you an experience or two of my own since coming to the Rhondda. It is no uncommon thing to repair a main where the spigot has been forced through the socket (say) to-day, and in a week's time to receive another report from the same place, and find that the main has been pulled apart 2 in. or more. I was superintending the excavating for a bad gas leak in Ynyshir, and as the men uncovered the main the squeeze was so great that the main was grinding itself to powder under their feet while they were working. It sounds as though I am exaggerating, but I assure you that it is quite true. In one part of our area the South Wales Electrical Power Company found their 3 in. to 4 in. steel armoured cable pulled apart, and, as a result, they have had expansion joints installed in all parts of the valleys. The Rhondda Tramways Company have had their tram-rails torn in two in several places; and, on the other hand, they have to cut sections out of the rails, to allow them to bed themselves in the concrete, the rails having sprung-up owing to the squeeze from the mountains. As a result of these disturbances, we have to be continually inspecting for gas leakages.

In order to facilitate matters, our area is divided into three districts, and each district has its separate gangs, who, when there are no reports to hand, test the mains by meter. We use a 10-light meter, specially made for the purpose, which will register three-fifths of a cubic foot per hour and upwards. This meter has a dial on the top instead of the front; and, in addition to the usual pointers, it has one large pointer that travels round the dial and gives the hourly rate of leakage by taking one-minute observations. There is a pressure gauge on the side, and also a small tap on the top of the meter on the outlet side. This tap serves a dual purpose. First, you can see at a glance whether the bags are holding tight or not; and, secondly, that the main is properly charged with gas before testing—otherwise your test would not be true. As you are aware, it is customary to drill five holes for testing—the two outer ones for the inlet and outlet pipes, the next two for the bladders, and the centre one is used for filling the space with water to prevent the gas passing the bags while testing. Drilling five holes in a 3-in. main considerably weakens it, and I have found this small tap saves our drilling more than three holes, and one at the other end if there is gas both ways. After you have your meter connected-up and your bags in position, you merely open the little tap just mentioned, and if the meter works you can safely say that the bags are holding. On the other hand, if the meter hand remains stationary, your bags are not holding.

I have taken great pains to explain this meter because, as you know, the fewer holes you have in a small main the greater is its tensile strength. Of course, wherever possible it is advisable to utilize existing holes or services. The great strain put upon our mains to-day, even in an ordinary town, by heavy motor and other traffic makes this very essential. Generally we take a full street length to test; and should we find there is a heavy leakage—say, about 6 to 12 c.ft. per hour—the street is divided into sections, tests are again made, and the leakage located within a small compass. Repairs are effected by re-caulking the joints; care being taken to test the joints with soapy water after re-caulking. Should we consider the leak on joints does not justify the meter registration, the services are examined, and, if necessary, repaired.

I have explained previously that sometimes there is a squeeze, and at other times a pull, on the main. When repairing a main, we usually allow from 2 to 3 in. of space between the two spigot ends; and this necessitates using a special double collar. The usual size or length of a 3-in. collar is 10 in. to 11 in.; but we employ one that is 16 in. to 18 in. long, according to the diameter of pipe under repair. The reason for this is obvious—namely, to allow for either drag or push.

Reports are continually coming into the office, and these have our first attention. We employ the usual methods to locate our leakages. To give you some small idea of our work, I have compiled the following figures for the three years 1922, 1923, and 1924:

Year.	Holes Barred.	Joints Repaired.	Broken Mains.	Services Repaired.	Tests by Meter.
1922. . .	9,216	935	15	115	219
1923. . .	9,887	1225	31	136	260
1924. . .	18,805	1058	29	121	96

You will observe that more holes were barred and fewer tests taken during 1924 than in the other years under review. The explanation of this is that we had more reports to hand, and testing had to remain in abeyance. You may query: Why not bar at all times instead of testing? In view of the fact that we bar when a report comes in, my answer is, Expense. When a leakage is reported, you have a definite spot to work upon, and, generally, not much barring to do before locating the leak. Consequently, two or three men in addition to the man in charge are sufficient; but if, on the other hand, you are going to bar through a whole district, at least nine or ten men are required, if you are to make any impression, whereas three or four men and a foreman will get through more work and do it much more simply.

Heavy traffic on our roads has knitted the surface and the ground in such a consolidated form that it takes some time to drive a bar down, and, incidentally, pull it out again. You must also take into account the nature of the subsoil. If it is a plastic clay, your men need to drive the bar directly over the leakage, otherwise they would often be misled. Putting the main under meter test removes all these difficulties, for, whatever surrounds the main, your meter will indicate an escape, if one exists. I would not advocate testing by meter mains over 6 in. When you exceed that dimension, in my opinion the bar and indicator is the best method.

Leaking joints are what we suffer from most in the Rhondda; and before I came here they were fixing a patent clip to the joint. We are still fixing them, though not to the same extent as we did before the war. Perhaps I had better describe these clips to you. A wrought-iron band in two sections fits round the socket with a projection on either side, and is firmly held in position by bolts in front of the socket. On the spigot end entering the socket is fixed a cast-iron clip, also with projections bolted together. This clip is allowed sufficient play to move easily round the main. A split rubber ring is then inserted between the cast clip and face of the joint, and held in position by a two-pronged fork. Two long bolts are now used to pull the cast clip firmly up to the face of the joint and rubber, and the two-pronged fork is removed. If proper care is exercised, these clips are very effective.

Care has to be taken when filling-in; a man using a rammer carelessly would negative your work immediately. Having in mind the possible effect gas would have on rubber, we were rather anxious to see their condition; and receiving a report from a place where we knew these clips had been down for a few years, we thought it an opportune time to dismantle one. On doing so, we found the rubber in a perished condition; but, in fairness, I must say the ground was saturated with water, which, of course, was not conducive to long life. We thought it conclusive that, if we could get something that would nullify the effects of gas and water on the rubber, the clips would be a great help to us. After experimenting with several compositions, we decided to use paste graphite. This is smeared in front of the joint and on the face of the cast clip before being tightened-up. When in its place the rubber is encased in graphite. We have since examined one treated in this way, and the rubber was in a perfect state of preservation.

The services we find in all kinds of fantastic shapes—some bent up, others down. They generally take the line of least resistance. The bends, also, we find buckled or pulled out of the main. I am speaking now of every-day occurrences. When we find there is a big movement on, causing the bends or services to buckle or draw apart, we usually insert, next to the main on the bend, a piece of lead pipe about 18 in. long in the shape of an **S**, with a patent connector attached. This acts all right until the gasway is either stopped or pulled apart, as the case may be; then relaying has to be done. Up to now I have not mentioned public lighting or meters overworked—that is, meters which are too small for the work they have to perform—or the gas that is lost through faulty by-passes and lamplighters failing to keep to the stated time for lighting and extinguishing, imperfect lamp governors, and other little things that tend to help along the unaccounted-for gas. I shall pass over these as trifling, though I assure you they are well looked into.

You will remember I said earlier in my address that ours was a long straggling area. The Porth Gas-Works are situated at the lower end of the valleys; there is also a works at Ystrad, about 6 miles up the valley. Owing to the distance, it was found advisable to erect a holder at Tonypandy, and this holder is supplied from the Porth works. The gas in its passage from Porth to Tonypandy has to pass under three river bridges and one railway bridge. In doing so, there is approximately 300 ft. of 15 in. to 10 in. main exposed to the vagaries of the weather. Besides this, there are several bridges where the mains are merely under the ground. All this tends to reduce the gas in bulk as it is passing from the works to the holders and the consumers. Especially is this so when you have a sudden change of temperature, such as we get in the Rhondda—and in any other valley, for that matter. There is a holder at Treorchy, about another 3 miles higher up than Ystrad; and this holder takes its gas from Ystrad. On this length we are not troubled much with exposed mains—only for 20 ft., as it enters the holder yard. There are also great differences of altitude in our area, which tend to increase our pressure. As an example, going up to Trebanog the pressure is nearly 80-10ths when there is 35-10ths on at the Porth works. We have these variations in pressure all along the valley; and if there should be a broken main or service or badly drawn joint *en route*, we have to a certain extent to depend on some good Samaritan to apprise us of the fact, otherwise we should soon lose a lot of gas. All these little set-backs cause us considerable anxiety, and go a long way towards augmenting our unaccounted-for gas. During the summer months our lamps are extinguished at midnight.

Therefore we can take night tests by sectioning the valley, thereby getting a fairly accurate idea where the biggest leakage is going on.

Importance of the Gas Industry.

So far I have endeavoured to explain some of the difficulties which exist in the distribution of gas in an area that is subject to abnormal conditions. The problem we have to face is one of great importance, both from the point of view of excessive loss sustained on the one hand, and the necessity for safety on the other. In spite of this, we endeavour to overcome our difficulties, and at the same time to extend our business. The gas industry as a whole has since its inception been able to make great progress. From time to time competition has developed; and without hesitation it may be said that such competition has been to the benefit of the general public, for it has kept before the gas industry the idea of service first, with the result that consumers have had all the attention of the genius and commercial ability that the profession has produced. Where expansion of business has been most pronounced, generally speaking, competition has been the keenest. There is, however, in the lay mind, the idea that electricity must supersede gas, and that the former commodity is the ideal in every respect. This for a long time has been erroneously fostered by the Public Press enhancing such adaptability and usefulness as electricity may possess because of extraneous work, such as wireless transmitting, which it may be able to do. Being closely associated with engineering, we would be the last to decry the value of electricity; but we know its limits, and where gas can be successfully utilized we have no hesitation in recommending it for those purposes, in spite of anything that might be said to the contrary. Admitting, then, the relative value of the commodities under discussion, it seems as if a new phase were to be encountered in our activities. No amount of argument can discount the fact that the gas industry is one of the most important industries in the country, with a capital invested in it of over 160 million pounds. Recently, however, there has been a tendency to nurse and foster our competitor by means of subsidies, and pronouncements have been made on this subject by leaders of the industry; but we cannot too forcibly impress upon the public mind that the time has come when the gas industry must make its claims known without hesitation.

We use, in the course of our business, over 17 million tons of coal per annum; and it is hardly feasible to think that the cessation of such a market would not affect the mines. Thus, even by this small illustration, without mentioning immense subsidiary industrial works depending upon the gas industry, it can be seen that the result of unfair competition would be such as to necessitate further subsidies, perhaps under the guise of unemployment dole. The electrical undertakings are commercial concerns; and an examination of their returns on the capital invested shows that they are paying far better than the gas industry is allowed to. Also, they have no difficulty in raising the necessary capital for developing purposes on business lines. There is a lot of talk in Parliament of laying cables to country districts; but to run electric cables through sparsely-populated areas is a Utopian scheme benefiting no one. If electricity in isolated areas is so necessary, why not subsidize other forms of production? Unemployment cannot be materially assisted, as the power load of any producing factory or yard is a very small item in the total expenses of the output.

Super-power stations may have a magnetic attraction to the lay mind; but until some cheaper form of transmission is devised, generating costs are not the end-all of the scheme. Distribution, even in a well-populated area, has been placed at 0·6d. per unit, a figure which electrical engineers would not consider unreasonable; and with one of the items exceeding the sum mentioned, it is impossible to see how the current is going to be supplied at a competitive rate justifying the huge outlay of State money. On the other hand, the gas industry is progressing; the increase in output during the past five years exceeding the increase of any previous quinquennial period. More attention is being given to fostering the use of gas commercially, as well as in the domestic field; and there can be no doubt that a point the public should appreciate is the decrease in the atmospheric filth in our cities, with the consequent boon of better health and the preservation of building fabric. I admit this is very small up to the present; but it will get better as the public show their appreciation by using more gas and fewer coal fires.

Let us arm ourselves with the facts that are at hand: The conservation of coal, and the provision of bye-products of coal, not forgetting that the industry employs over 100,000 people, and pays more than 15 million pounds in wages, while the civic authorities benefit to the sum of over 2½ million pounds, being rates and taxes including income-tax. Our slogan must be: "Let the public know;" and I take this opportunity of suggesting that members of the Junior Association should arm themselves with all the facts available, and educate the public mind with such information as can be of assistance in suggesting that, while we require no subsidy to carry on our business, and do not ask for help in that direction, neither do we consider that other utility bodies should be taken under State protection, with State aid which incidentally the gas industry would have to help to provide.

We have as a body endeavoured to interpret faithfully the idea of "service without ostentation." We have gone about our business and given the general public of our best. Now the time has arrived when we should not hesitate to say what we have done and what we are doing. In other words: "Blow our own trumpets." One hesitates to do this kind of thing; but when we hear our friends across the way doing it, to the detriment of the gas industry, we have no alternative. In this way the man in the street may be able to form a true impression of the magnitude and value of the industry to which we belong.

Mr. D. M. John (Aberdare) said that he had listened with a great deal of interest to the address. The portion dealing with the Rhondda distribution difficulties specially appealed to him, because his Company were in a like situation. They were finding of great advantage a system of postcard advice regarding leakage from consumers in outlying districts. He proposed a hearty vote of thanks to Mr. Wood.

Mr. C. S. Bateman (Cardiff), seconding, remarked that it would certainly be most unfair for one of two industries running side by side to be subsidized financially to the disadvantage of the other. The generation of electricity from coal was, from the efficiency point of view, bad, and waste heat available on a gas-works should be utilized for this purpose.

Mr. Shepherd (Swansea), supporting, said that, while they should know all they could about the commodity with which they had to deal, it was at the same time very necessary to know something of what their competitors were able to do. He was of opinion that it would be an advantage in their advertisements to tell the public more of the effects—on health, comfort, and hygiene—of gas apparatus, instead of merely saying gas appliances were best.

Mr. T. A. Canning (Newport) was of opinion that, taking all the factors into consideration, it was a great credit to the management of the Rhondda gas undertaking that the price of gas and the percentage of unaccounted-for gas were so low. Mr. Wood had referred to the electrical subsidy which was being broadcast as a panacea for unemployment. If those interested in these matters would read Mr. D. Milne Watson's two addresses, lately given, they would immediately realize that electricity would certainly not bring relief from their present evils.

Mr. Wood, in response, said the gas industry had been too quiet in the past. He was a strong believer in publicity; and they should educate the public as to the benefits to be secured by the use of gas.

On the proposition of Mr. Bell, seconded by Mr. Bateman, thanks were accorded Mr. Octavius Thomas for his hospitality in entertaining the members at tea.

Calorific Power in the United States.

The Washington Department of Public Utilities have authorized the Spokane Gas and Fuel Company to sell gas of 450 B.Th.U. In their Order, the Commission confirm the findings of their Chief Engineer, who originally reported that the cost of manufactured gas of the standard prescribed by a temporary Order—namely, 500 to 530 B.Th.U. for Seattle, 520 to 560 B.Th.U. for Spokane, and 450 to 475 B.Th.U. for Tacoma—was less than the 600 B.Th.U. standard which was in effect prior to Jan. 1, 1921, while a careful analysis of the records of the different companies indicated no material increase in consumption due to the lower calorific standard. Experiments, tests, and study of appliances commonly employed in the utilization of gas showed that there was practically no difference in efficiency between the new standards named and the old 600 B.Th.U. standard. Later, when considering the practicability of a further reduction in the heating value of the gas manufactured by the Spokane Gas and Fuel Company, he reported that the gas manufacturing plant of the Company consisted of a combination coal gas and producer gas plant capable of an output of 850,000 c.ft. of 530 B.Th.U. gas per day and a water gas plant capable of producing 800,000 c.ft. of 300 B.Th.U. gas when not enriched with oil, or the same amount of 530 B.Th.U. gas with oil enrichment. The coal gas plant produced gas with a calorific value of 600 B.Th.U., which was reduced to 530 B.Th.U. by the addition of the requisite quantity of 148 B.Th.U. producer gas. For compliance with a 450 B.Th.U. standard, it was proposed to manufacture a gas consisting of approximately two parts of coal gas and producer gas of 530 B.Th.U. and one part of 300 B.Th.U. water gas. It was not thought that this further lowering of the calorific power would appreciably increase the consumption, because the gas would have a high flame temperature and would be of uniform quality. He added: "Tests have shown that the proposed gas will contain more B.Th.U. per cubic foot of the products of combustion. The latter condition appears to be a more reliable indication of the heating value of a gas than its heating value before it is mixed with the air."

Books Received.—"The Design and Arrangement of Chemical Plant in Relation to its Economic Control," by Dr. Geoffrey Weyman, and "The Chemistry of Power Plant," by W. M. Miles (Ernest Benn, Ltd.; price 6s. net). "Copper," by N. E. Crump (William Rider & Son, Ltd.; price 10s. 6d. net).

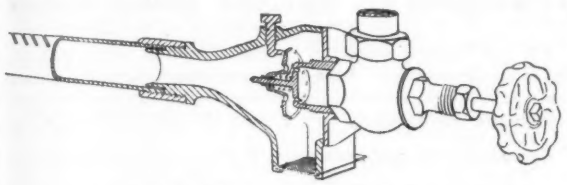
REGISTER OF PATENTS.

Gas and Air Mixer and/or Regulator.—No. 239,256.

TURNER, E. (ERNEST TURNER & Co.), Manchester.

No. 10,961; May 3, 1924.

The object of this invention is to provide a gas and air mixer and/or regulator wherein a more efficient mingling of the fluids is effected, a further object being to provide improved means to regulate the admission of one or both fluids.



Gas and Air Mixer.—E. Turner & Co.

One method of carrying out the invention is shown in the perspective drawing (which we reproduce) of a burner for gas under high pressure and air at atmospheric pressure. A casing is provided having a central longitudinal bore (preferably funnel shape, as shown). Attached to the back is a tubular fitting to which high-pressure gas flows from a valve. Round the front end of the fitting a series of orifices is formed, constituting jets through which the gas issues; and upon a spindle is mounted a disc (called the ejector plate) formed with a series of slightly larger holes adapted to register with the first-mentioned. Space is left between the ejector plate and the perforated end of the tube to allow air to enter, between and around the jets of gas, from the air inlet, which may be covered with gauze and provided with a sliding plate to regulate the size of the opening.

The ejector plate is slidably but non-rotatably mounted on its guide, and is normally pressed outwardly by a spring so as to bear against a crank arm or cam on a turn screw manipulated by means of a knurled head from the exterior of the casing, so that the distance apart of the two sets of orifices can be varied. The holes of larger size are preferably slightly tapered with the large end at the rear, and the edge of the ejector plate is bevelled rearwardly to agree with the taper of the coned casing.

Other features and variations of the burner are described and illustrated in the specification.

Mixed Gas Producer.—No. 239,280.

HUMPHREYS & GLASGOW, LTD., and STELFOX, J. C., both of Victoria Street, S.W. 1.

No. 13,616; June 4, 1924. No. 26,197; Nov. 3, 1924.

According to this invention, which is for the production of mixed gas by the carbonization of coal and the making of water gas in one apparatus, blast gases are led off from the coke without passing through the coal, and are utilized to heat recuperative chambers; and the coal is carbonized partly by the passage through it of fresh gas-making steam superheated by being passed through the recuperative chambers and partly by the passage through it of hot water gas produced by steaming the coke. If required, some of the coal gas and water gas produced may be superheated in the recuperative chambers and circulated through the coal. Oil may be sprayed into a recuperative chamber, when not used for superheating steam during an up run, and the water gas thus carburetted.

The whole of the blast gases are passed through the recuperative chambers, and such portion of the combustible in these gases is burnt as is necessary to raise the chambers to the required temperature. Alternatively, the blast gases produced during a portion of the time the coke is blasted with air are led off from the coke, and, without passing through the coal, are used to heat the recuperative chambers, and thereafter blast gases are passed through the coal, thereby helping to carbonize it; the resultant gases, consisting of blast gases comparatively rich in CO and gases evolved from the coal, being stored, it may be, together with the water gas.

It will be seen from the sectional elevation reproduced that the apparatus comprises a water gas generator 1 with superposed carbonizing chamber 2, a recuperative chamber or chambers—for instance, a carburettor 3 and a superheater or fixer 4 of suitable kind—steam inlets 5 and 6 at the bottom of the generator and the top of the superheater or fixer respectively, gas offtakes 7 and 8 leading from the top and the bottom respectively of the carbonizing chamber to the carburettor, and a gas offtake 9 from the bottom of the generator to the pipe 10 leading from the top of the superheater or fixer to the gasholder. The generator 1 and the carbonizing chamber 2 are shown in free communication, and an annular flue 11 surrounds, and is open to, their junction; the offtake 8 being connected to this flue. Valves 7^a, 8^a, and 9^a are provided in each of the offtakes, and a valve 12 is also provided in the pipe 10 on the superheater side of the offtake 9. The valves 7^a and 8^a are coupled so that when one is open the other is shut; and the valves 9^a and 12 are coupled so that when the former is closed the latter is open and when the former is open the latter is shut or, if recirculation of some gas is required, partially shut. A threeway steam valve 13 is also coupled to the two latter valves so that, when the valve 9^a is open, steam is directed through the steam inlet 6 to the top of the superheater or fixer, and when it is closed steam is directed through the inlet 5 to the bottom of the generator 1. 13^a is the steam supply valve; 14 is the blast air pipe with valve 14^a; and 15 is the stack valve.

The process and apparatus are especially designed for utilizing soft coal; and in starting up, the generator 1 and the carbonizing chamber 2 are first filled with coke. Afterwards coal is fed to the chamber 2, becoming coke as it passes down to the generator.

The specification further elaborates the methods and cycle of working.

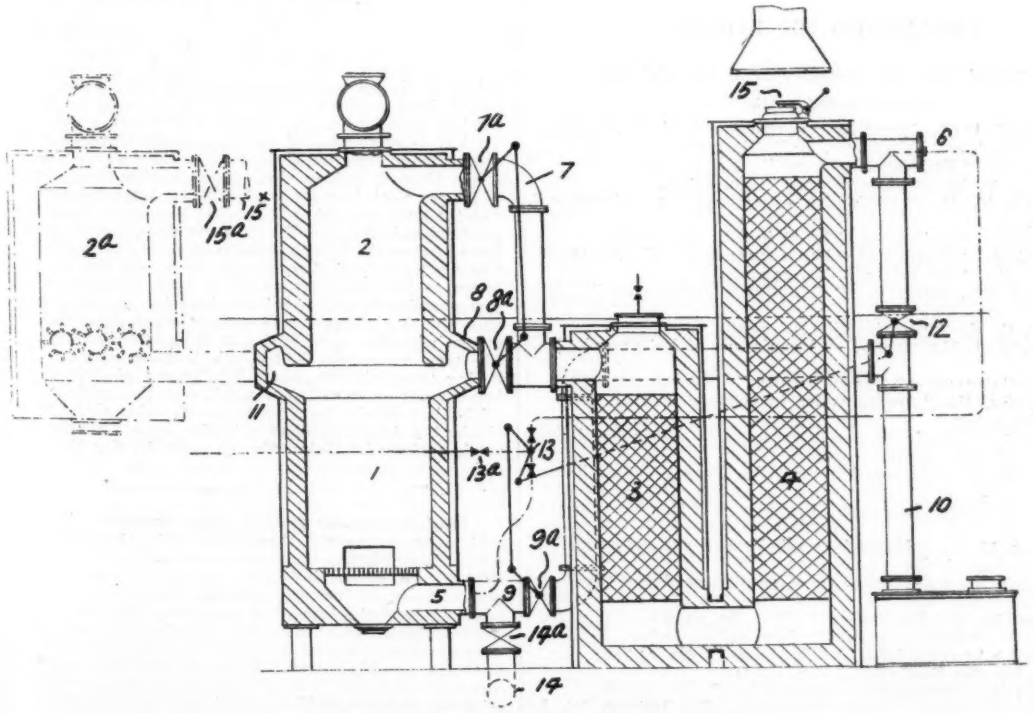
Meter Diaphragms.—No. 239,641.

HANSFORD, J., of Enfield.

No. 15,965; July 3, 1924.

This invention is for a gas meter or other apparatus comprising a diaphragm composed of leather or the like and having means for supplying the diaphragm with oil or other substance to retain the diaphragm in condition. The feature is a wick mounted between the disc and the diaphragm.

One method of construction is to form the diaphragm discs with corrugations or circular recesses adapted to contain wicks which are saturated and are held in contact with the diaphragm.



Mixed Gas Producer.—Humphreys & Glasgow, Ltd.

Purifier Valves.—No. 239,672.

Brooke, R. M., of Ovenden.

No. 18,756; Aug. 7, 1924.

This invention consists in an arrangement of valves and connections for gas purifiers and the like, wherein, in a number of purifiers working together, a valve casing or body divided into two sections is associated with each purifier, one of the two sections being connected to the purifier at the bottom and the other to the top. In each of the two sections is a number of valves, according to the number of purifiers; or, if it is desired that one of the number should always be shut off for the purpose of being emptied and refilled, an additional valve in each section should be employed. One of the valves in each section is connected with the gas inlet main which conveys the gas to the whole of the purifiers; another valve in each section is connected with the gas outlet main of the purifying plant; and the rest of the valves in each section are connected with the requisite number of return mains for circulating the gas from one purifier to another through the medium of the respective valve casings. By these means any number of the purifiers may be in use simultaneously and working in any order, either backward or forward, in rotation or out of rotation, either upward or downward. The boxes, in addition to working in series, may work in parallel by dividing the stream of gas so as to pass through two or more at the same time.

Two arrangements of the valves are illustrated and described in detail in the specification.

Gas Meters.—No. 239,923.

Peebles, W. C., and Hounam, A. T., both of Bonnington.

No. 14,592; June 17, 1924.

This invention is for improved means of securing the flexible members of gas-meter diaphragms in position. There is provided a closely coiled spring (there may be more than one) of a length such that when the ends of the spring are joined it will tightly embrace the usual metal rim; and there are means for joining the ends of the spring such that the spring will, in effect, be endless. The joint consists essentially of a screwed element adapted to engage internally the ends of the coiled spring; the threads of the screwed element being of the same pitch as the coils of the spring. This screwed element may either be in the form of a solid plug or may be a stiffly coiled spring of less diameter.

Pipe-Joints.—No. 239,992.

Victaulic Co., Ltd., of Westminster, S.W. 1, and Johnson, P. G., of Woodberry Grove, N. 4.

No. 20,405; Aug. 28, 1924.

This invention relates to pipe joints having a ring of flexible material extending across and sealing the gap between the adjacent ends of the pipes, and seeks to provide means for preventing undue movement of the members of the joint along the pipes without having to provide flanges, grooves, recesses, or projections of any kind on the pipe ends.

This is effected by providing, in connection with the flexible packing ring, a positioning ring or flange, or a portion of a ring, or equivalent device, of which the outer periphery or portion extends into the packing ring, while the inner portion extends between the adjacent pipe ends.

Two embodiments of the invention are illustrated and described in the specification.

APPLICATIONS FOR PATENTS.

[Extracted from the "Official Journal" for Oct. 14.]

Nos. 24,704-25,358.

Bond, V. C.—"Gas heater for curling-tongs, &c." No. 24,834.
Clorius, O. T.—"Calorimeter, &c." No. 25,280.
Coulier, S.—"Purification of gases." No. 25,149.
Davidson, T. M.—"Gas producers." No. 24,813.
Davidson, T. M.—"Distillation of carbonaceous substances." No. 23,814.
Diaz, A. V.—"Gasification of liquid fuels." No. 25,150.
Downs, C. R.—"Distillation of bituminous materials." No. 25,026.
Durand, E.—"Gas valves." No. 25,220.
Glover & Co., Ltd., G.—"Coin-actuated mechanism." No. 25,336.
Jackson, G. M.—"Gas rings." No. 25,062.
Jackson, W. J. Mellersh-.—"Manufacture of fuel gases." No. 25,082.
Koppers Company.—"Gas purification." No. 25,339.
Ljungström, B.—"Apparatus for interchange of heat between gases." No. 24,935.
Parker, A.—"Combined apparatus for gas making and fuel carbonization." No. 25,032.
Parkes, D. W.—"Removal of tar acids from ammonia liquor, &c." No. 25,288.
Patent Retorts, Ltd.—See Davidson, T. M.—Nos. 24,813, 24,814.
Pedneker, M. L.—"Means for scrubbing coal gas and extracting oil, &c., therefrom." No. 24,758.
Prat, G. J. A. L.—"Means for separating solid particles from gases." No. 25,317.
Robinson, H. W.—See Parkes, D. W. No. 25,288.
Simpson, S.—"Dry gas meters." Nos. 24,839, 24,840.
Stewarts & Lloyds, Ltd.—"Pipe joints." No. 24,712.
Tice, H. H.—See Bond, V. C. No. 24,834.
Umpleby, F.—"Generation of gaseous fuel." No. 25,066.
Western Gas Construction Company.—See Jackson, W. J. Mellersh-. No. 25,082.

MISCELLANEOUS NEWS.

GAS REGULATION ACT APPLICATIONS.

There has appeared in the "London Gazette" the following notice regarding an application to the Board of Trade under the Act.

DECLARATION OF CALORIFIC VALUE

Ormskirk District Gas Company.—450 B.Th.U. (Jan. 1, 1926.)

METROPOLITAN GAS COMPANIES' OFFICIAL TESTINGS.

The Gas Referees' reports of the official testings for the past quarter under the provisions of the Gas Regulation Act give the following average calorific values for the Metropolitan Companies named.

Brentford Gas Company.—500·6 B.Th.U. (declared calorific value, 500 B.Th.U.).

Commercial Gas Company.—479·2 B.Th.U. (declared calorific value, 475 B.Th.U.).

Gas Light and Coke Company.—503·4 B.Th.U. (declared calorific value, 500 B.Th.U.).

South Metropolitan Gas Company.—562 B.Th.U. (declared calorific value, 560 B.Th.U.).

South Suburban Gas Company.—502 B.Th.U. (declared calorific value, 500 B.Th.U.).

Tottenham District Light, Heat, and Power Company.—502·7 B.Th.U. (declared calorific value, 500 B.Th.U.).

Wandsworth, Wimbledon, and Epsom District Gas Company.—476·5 B.Th.U. (declared calorific value, 470 B.Th.U.).

PUBLIC LIGHTING DIFFICULTIES IN IRELAND.

The following article, which appeared last week in the "Belfast Telegraph," will doubtless be of interest to our readers.

A Southern Ireland town which is well known in the Free State has a Council of its own, and this body omitted to pay their gas bill for three years. The Gas Company, after fruitless efforts to obtain payment, cut off the supply, and the town was plunged in darkness. A stormy meeting of the Town Council followed, and tenders were invited for petrol lamps, which were to be installed in the existing street lamps. The Gas Company protested that the street lamps were their property, and that they would not allow the petrol lights to be placed therein. The Town Council were defiant. The petrol lamps arrived, and were duly installed in the street lamp-posts. For a brief period the gloom was gone.

Then the Gas Company's Manager and his staff arrived on the scene, and removed the petrol lamps, which were taken to the gas-works and stored there. The town was in darkness again.

Manager and Staff Arrested.

Another stormy meeting of the Town Council was held, and the Civic Guard were ordered to proceed against the Gas Company's Manager and staff, which was done. A further meeting of the Town Council took place, when the Gas Company produced their title deeds, showing in plain black and white that the street lamps were their property. The Council asked a solicitor to state a case for the Court, but the solicitor cautiously demanded his fee in advance. The Council's pockets being empty, the case fell through, and the proceedings were dropped.

The Council then erected rough wooden standards with cross-pieces on top beside each street lamp, and installed petrol lamps thereon. The town enjoyed light for a while, and a man was appointed at a salary of £1 per week to tend and light the lamps. Soon the town had a fresh thrill, for the lamplighter, being an inexperienced or careless person to handle dangerous stuff like petrol, was blown up. He had to go to hospital for three months, and then claimed heavy compensation from the Council. The town was in darkness again.

The Council, undaunted, employed another lamplighter, at a salary of £2 per week in consideration of the dangerous nature of his job; and the town enjoyed light again. Meanwhile the petrol lamps had not been paid for, and the company that supplied them, after fruitless efforts to obtain money, came along and took possession of them. The town was in darkness again for a long time, and the residents began to fear that they would be in darkness for ever. All hope was abandoned, and individual householders, in despair, arranged with the Gas Company to connect pipes from their own private meters with the street lamps at their own doors and shop fronts. The town was again lighted in a half-hearted way. Householders, having to pay for the street lighting out of their own pockets, refused to pay rates, and the Council were then without finances.

The last act in the drama was the Council's surrender. They obtained a loan somehow, paid the arrears of gas bills, made a public apology for their action towards the Gas Company's officials, and undertook to behave in future.

Efficiency Cup for Willey's Cadet Company.—Alderman T. Glanfield, representing the Devon Territorial Association, on Oct. 14 presented the Willey Cadet Company with a silver cup for general efficiency on parade during their annual training at Paignton this year. As their first Commanding Officer, he naturally felt very proud to have the honour of presenting the trophy, and was sure they would in future maintain the discipline, and have that self-respect, reliance, and control which was expected of them, and which had been so ably maintained by all who had passed through the ranks of the corps. They must try to keep a high standard of efficiency and so uphold the good name the Willey Cadet Company had earned since its formation.

PORTSEA ISLAND GAS ORDER.

Official Inquiry.

On Thursday, Oct. 15, at the offices of the Board of Trade, Mr. J. F. RONCA (Director of Gas Administration) opened an inquiry into the application of the Portsea Island Gas Light Company for a Special Order under section 10 of the Gas Regulation Act.

The purposes of the Order are to authorize the transfer of the Havant Gas Company to the Portsea Island Company (the name of the amalgamated undertaking to be "The Portsmouth Gas Company"), the extension of the limits of supply beyond the present limits of the two companies, the consolidation and conversion of capital, and the raising of additional capital. The Order contains other miscellaneous provisions.

The Portsea Island Company were represented by Mr. Rowand Harker. There was opposition by the Portsmouth Corporation, represented by Mr. F. J. Wrottesley, for the purpose of protecting the interests of the Portsmouth consumers; by the Havant Urban District Council and the Havant Rural District Council, represented by Mr. H. Baker (Messrs. Baker & Co., Parliamentary Agents), whose main concern was that there should be a local office in Havant after the amalgamation; and by the Portsmouth Trades Council and Labour Party, represented by Mr. M. Schofield, in the interests of consumers. Mr. Baker also watched the proceedings on behalf of the Havant Gas Company.

Originally there was opposition by the Southern Railway Company; but this was withdrawn on the insertion, by agreement, of provisions protecting the Railway Company in respect of works carried out by the Gas Company involving interference with or affecting their railway bridges, roads, approaches, and works.

Mr. ROWAND HARKER, in his opening statement, dealt first with those parts of the Order concerning the transfer, the extension of the limits of supply, and the consolidation and conversion of capital. There could be no doubt whatever, he said—and it was admitted in substance, though not in terms, by the Portsmouth Corporation—that the proposed transfer would be of considerable advantage to the consumers in the present Havant area. The scheme was fair and equitable both to the consumers and to the shareholders.

The Portsea Island Gas Light Company was incorporated by Act of Parliament in 1821, its area of supply being the Island of Portsea (on which Portsmouth is situated). Further powers were obtained from time to time, and the present area of supply consisted of the Borough of Portsmouth and three parishes outside.

With regard to capital, Counsel referred particularly to the fact that the Portsea Island Company were operating at the present time with five denominations of shares, with standard dividends of 10, 9, and 7 p.ct. (and a slide of 5s. in each case), as well as £9012 10s. of 5 p.ct. maximum stock. In 1882 the sliding-scale was applied, and the standard price fixed at 3s. 4d. per 1000 c.ft. on the Island of Portsea, and 4s. 6d. per 1000 c.ft. in the outside parishes. By an Order under section 1 of the Gas Regulation Act, the standard prices were converted to 16d. and 18·8d. per therm respectively, but an Amending Order in 1924 reduced them to 11·8d. and 14·6d. respectively. The present selling price on the Island was 8d., and in the outside areas it varied from 9d. to 9·8d. The price of 8d. was also charged in a part of the Borough of Portsmouth which was previously the parish of Wymering, though the Company were entitled to charge more in that particular area.

The Havant Gas Company was incorporated by Act of Parliament in 1910, though it existed for many years previously as a non-statutory undertaking. The area of supply comprised the whole of the Urban District of Havant, two parishes in the Rural District of Havant, and part of the Urban District of Warblington. The capital consisted of three denominations of shares, with standard dividends of 10 and 7 p.ct. The present standard price was 14·6d. per therm, and the selling price 14·44d. per therm.

The existing works of the Portsea Company were ample for the manufacture of the gas at present demanded in the Portsea and Havant areas, as well as the increased demand which was anticipated in the course of the next few years. The maximum capacity of the Portsea Company's manufacturing plant was 10·5 million c.ft. per day, and the maximum output on any one day had been 9·2 million c.ft., leaving a surplus capacity of 1·3 millions. The present total output in the Havant area averaged, over a year, 98,600 c.ft. per day, and the maximum demand which the Havant works had been called upon to meet in any one day was 138,000 c.ft. The proposal was that, on amalgamation, the whole of the gas should be manufactured at the Portsea Company's works. Gasholders and certain subsidiary plant at the Havant Works would remain in use to assist distribution in the Havant area. If the amalgamation was approved, gas would be supplied in the Havant area at a price lower than at present, and, so far as one could foresee, at a price lower than that at which the Havant Company could hope to supply. It was clear that, for a time, at any rate, there should be a higher rate charged for gas in Havant than in the Borough of Portsmouth. In the Order it was proposed that the differential in the Havant area as compared with the Borough of Portsmouth should be 4d. per therm for the first five years from the date of transfer, and 2⅜d. for the second five years. After the expiration of the ten years, it was proposed that the amalgamated Company should have the option of charging a differential in the Havant area not exceeding 1⅝d. per therm. There was a proviso to the effect that the Company might at any time after the ten years reduce the price charged in one or more of the parishes in the Havant District, or any part or parts thereof respectively, without reducing the price in all or any other parishes or parts of parishes. In support of this, Counsel pointed to a similar provision in the 1887 Act of the Portsea Company, relating to parishes added to its area of supply in 1882. He apprehended that it was this provision which had enabled the Company to reduce the price of gas in Wymering (a parish added to the limits of supply in 1882, and which subsequently became part of the Borough of Portsmouth), without having to reduce it in the other parishes added in 1882, and which were not part of the borough. Therefore, the Company were asking for the same powers in the Havant area as they now possessed in the Portsea area.

The net result of the amalgamation would be, he believed, that the consumers in the Portsmouth area would in no way be prejudiced, and that the consumers in the Havant area would have the advantage of an immediate reduction in price. Immediately after the amalgamation the price in Havant would be 8d. per therm (the present price in Portsmouth), *plus* the differential of 4d., making a total of 1s. The present selling price in Havant being 14·44d., the consumers would benefit immediately by 2·44d. per therm. In arriving at the differential which should be charged in Havant, the Company had made due allowance for the items which were properly chargeable to the Havant area. These were the extra cost of supply to the Havant area as compared with Portsmouth (being principally the extra cost of distribution); the amount of compensation which it had been agreed should be paid; and the writing-off by a yearly contribution of certain assets of the Havant Company which would not be used after the amalgamation, owing to the fact that the whole of the gas supplied would be manufactured in the Portsea area. On the "credit" side, the Company had taken into consideration the probable increase in consumption in the Havant area. It was anticipated that, not only as the result of the development in this area, but also as the result of the lowering of the price of gas, there would be increased consumption.

With regard to the compensation which it was proposed should be paid to the Directors and Auditors of the Havant Company, there was opposition by the Portsmouth Trades Council and Labour Party. Counsel pointed out that there were five Directors, and it was proposed to pay each of them £262 10s., making a total of £1312 10s. For a series of years the Directors had received the munificent sum of £21 per annum, which, with income-tax, amounted to £26 5s. each, and it was proposed to give them ten years' purchase of this sum. That period might be longer than it was the practice of the Board of Trade to allow in the case of Directors, but the Company's justification for putting it forward was that the sum was very small indeed, and there could be no doubt that the Directors' remuneration would have been increased. As to the Auditors, there were two, each receiving £7 17s. 6d. per annum, and it was proposed to give them three years' purchase of that sum (which had been permitted by the Board of Trade in a number of cases), making £23 12s. 6d. each, or £47 5s. altogether.

When it was proposed to pay a really substantial sum in compensation—namely, £5000 to the Manager of the Havant Company—the Portsmouth Trades Council and Labour Party did not object. One found it difficult to see where the distinction was, because, in the case of Directors, they held office for three years, whereas the Manager was liable to dismissal at six months' notice. Counsel did not suggest, of course, that the Manager would have been dismissed, or that he was not entitled to a fair and reasonable compensation. His salary, *plus* bonus and other emoluments, amounted to £500 per annum, and it was proposed to give ten year's purchase of that, making £5000. The Manager had been in the service of the Company for more than twenty years, and, being more than 50 years old, it would be practically impossible for him to secure another position of a similar character. Therefore, £5000 was a fair and reasonable sum. It was proposed to pay the Secretary, whose salary was £75 per annum, seven years' purchase, making £525; and no objection was taken to that. The total to be paid in compensation, therefore, was £6884 15s.

As to the shareholders, it was proposed, in the first instance, to create, as soon after the date of transfer as practicable, a new class of shares in the Portsea Company (F shares of 10s. each, nominal value), and to allot them to the existing shareholders of the Havant Company in such a way that the dividend would be approximately the same as that which they received last year. For each "A" share in the Havant Company (nominal value £5, with a 10 p.ct. standard dividend and a 5s. slide), it was proposed to give ten "F" shares, and for each "B" or "C" share of the Havant Company (nominal value £5, with a 7 p.ct. standard dividend and a 3s. 6d. slide), seven "F" shares. Power was sought in the Order to create as many "F" shares as were required, and it was hoped, said Counsel, that it would not be necessary to issue certificates for them. Assuming that the Board of Trade approved of the consolidation and conversion of capital, the "F" shares were to be exchanged for converted capital; and as the date of conversion was to be the fifteenth day after the date of transfer, it was not considered necessary to issue "F" share certificates for that short period.

The consolidation and conversion scheme which it was sought to authorize was that, in place of the seven classes of stock which would exist on the day preceding the conversion, there should be issued two classes of stock in the amalgamated Company. (The seven classes comprised the five classes of standard dividend shares, the maximum dividend stock, and the temporary "F" stock of the Portsea Company which was to be created after the date of transfer.) The two new classes of stock would be the consolidated 4 p.ct. standard dividend stock subject to a sliding-scale, and the 5 p.ct. maximum stock.

The distribution was to be as follows:

Portsea Company's Stock.	New Stock.	£	s.	d.
For each "A" share of £53, 10 p.ct.	Cons. stock	66	5	0
	5 p.ct. max. stock	53	0	0
For each "B" share of £50, 10 p.ct.	Cons. stock	62	10	0
	5 p.ct. max. stock	50	0	0
For each "C" share of £50, 9 p.ct.	Cons. stock	62	10	0
	5 p.ct. max. stock	40	0	0
For each "D" share of £50, 7 p.ct., and For each "E" share of £50, 7 p.ct.	Cons. stock	62	10	0
	5 p.ct. max. stock	20	0	0
For each "F" share of 10s.	Cons. stock	0	12	6
	5 p.ct. max. stock	0	4	0

The new stocks were to rank for dividend from the day immediately preceding the date of transfer, and from that day the old stock was to cease to bear dividends.

The scheme, said Counsel, would not place the shareholders in

any better or worse position, and would not prejudice consumers, except with regard to one point which was raised by the Portsmouth Corporation—namely, the possible right to pay in some future year arrears of dividends on the maximum stock. The Company were prepared to discuss this with the Corporation; and he anticipated that agreement would be reached.

The slide on the consolidated stock was to be 4s. p.ct. per annum for every one-fifth of a penny increase or decrease above or below the standard price. It was also provided that the sliding-scale should operate quarterly instead of yearly—a principle which the Board of Trade had adopted in a number of cases.

As to the area of supply, it was proposed to extend this to include, in addition to the amalgamated Company's area, a number of parishes in the rural districts of Catherington, Droxford, and Fareham; and the local authorities concerned were not opposing. There was an objection by the Portsmouth Corporation, however, to the differential charge which it was proposed should be authorized in those parishes. The Company asked for authority to charge a differential in this extended area of not more than 4⅝d. per therm above the price charged in Portsmouth, and to reduce the price in any part of the extended area without reducing it in another, if desirable. The Corporation suggested that the proposed differential was not sufficient. The Company, however, though they did not contend that they could arrive at the true differential for the added area in so scientific a manner as they could for the Havant area, had come to the conclusion, taking all circumstances into consideration, that the differential suggested was a fair one, and would not impose a burden upon the consumers in the other part of the limits of supply.

With regard to the proposed differential in the Havant area—namely, 4d. per therm for the first five years, and 2⅝d. for the second five years, with an optional differential not exceeding 1⅜d. afterwards—while the Corporation of Portsmouth were prepared to agree to the 4d., they did not agree that the differential should be reduced in the manner suggested. The differential of 2⅜d. after five years was inadequate, and the progressive diminution was unduly accelerated. They also objected to the right to reduce the differential in one part of Havant and not in another after ten years, and were apprehensive that this power would to some extent nullify the protection which the Portsmouth consumers would be afforded by reason of the operation of a differential price. In this connection, Counsel said one must recognize that the interests of the Company and of the large body of consumers in Portsmouth were so bound up that it was extremely unlikely that a well-managed Company would ever do anything to the prejudice of those consumers.

Counsel then went on to deal with the objections of the Havant Urban District Council and Rural District Council, but Mr. Baker pointed out that the only point he desired to impress upon the tribunal was that there should be a local office at Havant. Counsel's comment was that the Company was managed by capable gentlemen, and if, for the purpose of properly conducting the business, it was necessary that there should be a local office in Havant, he had no doubt it would be provided. He was not in a position to give a definite assurance, however, that a local office would be established.

As to the objections of the Portsmouth Trades Council and Labour Party, one was to the payment of compensation to Directors and Auditors, on the ground that they as individuals might not be re-elected on the expiration of their period of office, and had no claim for services not rendered. One knew, said Counsel, that when Directors had served a company well, as had the Havant Directors, though they were not automatically re-elected, it needed very strong reasons to persuade the shareholders not to re-elect them. The possibility was so remote that it could fairly be ignored.

The Trades Council and Labour Party also objected to the power to reduce the differential in one part of the added areas and not another, unless due notice was given throughout the whole area of supply and the sanction of the Board of Trade obtained, as the power might be used to the advantage of a group of individuals and to the detriment of other consumers. Counsel reiterated his previous remarks on this matter, and added that it was a power that should be given, because it would probably enable supplies of gas to be afforded in occupied and urbanized areas, whereas otherwise such supply might not be given.

There was objection to the conversion and consolidation of capital, on the ground that the variation in capital values was in the interests of shareholders only, and in no way in the interests of the consumers. This objection, said Counsel, must have been drawn-up under a misapprehension as to the real facts; and it would be shown that the shareholders would not be better off. The sliding-scale of price and dividend was also objected to, as even with the variations of capital values, the privileged position of this Company, of having a sliding-scale providing for the same variation on all classes of shares, would be continued, to the detriment of the consumer. It seemed, said Counsel, that the objectors desired to put forward the case that, when the Company had gone to the public and issued shares upon the basis of the 5s. slide, this opportunity should be taken by the Board of Trade of altering that basis.

Mr. *William Cash* (Chairman of the Bournemouth, Croydon, Barnet, Worthing, and other Gas Companies, and Auditor to a number of others) has been advising the Portsea and Havant Companies on the financial side. He gave evidence, and produced a number of tables dealing with the financial position of the two Companies before and after the proposed amalgamation. Assuming the amalgamation were approved, and the consolidation and conversion carried-out as provided by the Order, the authorized capital of the amalgamated Company would be £940,297 6s. The amount issued would be £236,732 10s. of maximum 5 p.ct. stock, and £414,500 of consolidated 4 p.ct. stock, making a total of £651,232 10s., leaving £289,064 16s. unissued. The authorized borrowing powers (on the basis of one-half the issued capital) would be a maximum of £470,148 13s., of which £160,023 7s. 4d. would be issued, leaving unexercised (assuming the whole of the authorized capital were issued) £309,225 5s. 8d. It was necessary, said Mr. Cash, to create the two classes of stocks in order to preserve the rights of the shareholders exactly. He discussed the advantages which would accrue as the result of consolidation of stock, which was conducive to the proper and efficient conduct of the undertaking. Parliament had authorized it over and over again, and the Board of Trade had done so in one case of which he was aware. In the case of the Croydon Gas Company, of which he was Chairman, the capital had been consolidated very much on the lines proposed in the present case. Instead of five classes of stock they now had two, and had just issued more capital most successfully.

Other tables dealt with prices charged in the areas of the two Companies, the position with regard to dividends before and after amalgamation, costs of supply, capital charges, sales of gas, &c. Estimates of the total additional cost of supplying the Havant area, as compared with the Portsea area, were given, to justify the differential charges asked for. One of the factors taken into account was the estimated growth of consumption in the Havant area; and he had taken the rate of increase as 7 p.ct. per annum. He had taken an optimistic view as the result of his experience in similar areas. As an example, he said that the Bournemouth Company had taken over the Christchurch Company in 1913, with a sale of 23 million c.ft. per annum. The war intervened, but, in 1924, the quantity sold was 92 million c.ft. This was very largely due to district organization and pushing the sale of gas.

With regard to giving a gas company discretionary powers in respect of a differential, he suggested that a well-managed company should have such powers. If the business could be increased in the outer areas without a burden on the central area, the Directors would no doubt abolish the differential, because they were anxious to sell gas as cheaply as possible. If, on the other hand, the abolition of the differential in the outside areas would impose a burden on the central area, they would not abolish it, because it would damage the business in the central area. He gave precedents for the granting of discretionary powers.

As to compensation, he had no precedent for the granting of ten years' purchase of Directors' fees, but he mentioned a case in which it worked out at 9½ years, and another at 8 years. In those cases the auditors were given three years.

With regard to the differential in the area beyond the Havant area, he agreed that it should be higher than in Havant, but, on the other hand, if it were too high, the Company would not do any business. He had examined all the Orders granted by the Board of Trade under the Gas Regulation Act in this connection, and could not find any differential higher than the 4⅝d. suggested in the present case. It was not unreasonable. A well-managed Company such as this might fairly be trusted to administer its powers efficiently.

Mr. WROTTESLEY, cross-examining, said that there was so little difference between the figures of the Corporation and of the Company that he was willing to concede a differential of 4d. per therm for the first five years, and of 2⅜d. per therm for the second five years in the Havant area. He held, however, that if Mr. Cash's estimates of increased consumption, and consequent reduced costs, were too high, and the differential were abolished at the end of the ten years, there would be some hardship imposed upon the consumers in Portsmouth. He objected to the principle of discretionary powers at the end of ten years.

Witness said his experience had shown that the powers sought were useful, and there were precedents. One was the case of the Croydon Gas Company, when they had taken over the Caterham Company.

Mr. WROTTESLEY suggested that, instead of the differential of 1⅜d. being charged or not at the discretion of the Company at the end of ten years, they should be allowed to reduce it below 1⅜d. with the consent of the Corporation, with power for the Company to go to the Board of Trade if the Corporation were considered unreasonable.

Witness did not see the necessity for this.

Mr. WROTTESLEY, cross-examining with regard to the suggested power to lower the price in one part of the area and not in another said this had the same vice as the provision with regard to the differential. He also maintained that it would enable the Company to charge less for gas in the outer areas than inside the Borough of Portsmouth. Mr. Cash replied that the price outside the borough should not be less than inside, and that this was never intended.

In the subsequent discussion on this point, Mr. Cash said he had no doubt the Company would make it clear in the Order that this was not the intention. At the same time, Mr. Harker disagreed with Mr. Wrottesley's construction of the clause, but promised to examine it further in view of Mr. Wrottesley's criticism.

As to the differential in the added area, beyond the Havant area, Mr. Wrottesley did not consider the 4⅝d. to be sufficient, and suggested that 5d. was the very least that should be added. To Mr. Cash's reply that, with a compulsory addition of 5d., the Company would not do any business in the area concerned, Mr. Wrottesley retorted that, even with the addition of 5d., the charge would be only 13d. per therm, which was less than the price actually paid in Havant to-day. Mr. Cash said that, in the interests of the consumers in that area, and in Portsmouth, he would deplore a compulsory differential of 5d. He did not agree that gas should be supplied in that area at the same price as in Portsmouth, but he could conceive circumstances in which a consumer in the area beyond Havant should be supplied at a lower price than a consumer in Havant. The consumers in Havant had to bear the cost of writing-off the value of the works there which would not be used after the amalgamation, but the consumers outside that area had not.

In the course of further discussion, Mr. Cash asked why it should be assumed that the Directors of the Company would do stupid things. The reply was that they might consider the future rather than the present, which was not fair to the Portsmouth consumers. Parliament, in its wisdom, had assumed that Directors would do these things, and had devised safeguards. Counsel suggested that the Company might be asked by a prospective consumer in the outside area to supply him with gas at the same price as in Portsmouth, and that the Directors might agree to do it. Mr. Cash replied that of course they would not do so if it was uneconomical.

Mr. WROTTESLEY: But supposing it was economical?

Witness: Then it would hurt nobody.

Friday, Oct. 16.

Before Mr. Cash was further cross-examined, he dealt with the point which had arisen concerning clauses 27 and 29 of the draft Order as regards the differential being permissive, and as to reductions or increases of price being made in parts of individual parishes of the new area. In the first place, it was made clear that the provisos to these two clauses would be re-worded so that there would be no possibility of the Company being able to charge a lesser price in the outside areas than was being charged in Portsmouth. The exact form of the wording was left to the Parliamentary Agents. Mr. Cash then quoted a number of precedents in which differential prices were inserted in Acts of Parliament or Orders issued by the Board of Trade in which the price was to be not more, and not less, than a certain figure.

Mr. WROTTESLEY, during further discussion on the price question, said the Corporation had no wish to put difficulties in the way as regards the portions of the outside area now being supplied, or to embarrass the Company in any way; but their view was that in the remaining portions of the new area there should be a compulsory 5d. differential.

Mr. SCHOFIELD put a few questions on the subject of compensation to Directors and officers, in which he suggested that the Trades Council objected to the principle of compensation in general, and to the 10 years' period adopted in the present case in particular.

Mr. *Cash* said the reason for adopting ten years was that the Directors' fees had not been raised since the war.

Mr. SCHOFIELD also put some questions indicating objection to the present sliding-scale, and suggesting that the slide should vary according to the class of stock.

Mr. *Thomas Carmichael*, Engineer to the Portsea Gas Company, then gave evidence. He said that it was proposed to close-down the Havant Gas-Works so far as manufacture was concerned. At first, however, the gasholder and certain of the subsidiary plant would be made use of. A number of men would probably be thrown out of employment, but he undertook to give all the men engaged on the manufacturing plant work for three months after the transfer, and to take over as many of them as possible. Those men taken over would be allowed to join the superannuation scheme of the Portsea Company, and to count their years of service with the Havant Company as if they had been with the Portsea Company. Witness explained how the Company were already supplying, without powers, in one or two parishes included in the additional area now asked to be authorized, and how in these parishes the differential was less than that asked for generally. In one instance the differential over the Portsmouth price was 1·8d. per therm, and in another 2·4d. per therm. It was for this reason that powers were asked to vary the differential at the discretion of the Company in different parishes and parts of parishes.

Mr. WROTTESLEY again intimated that there was no desire on his part to embarrass the Company in any way, but the Corporation felt that the differential should be compulsory, while it objected to the right to vary the differential in parts of a parish.

Eventually the parties conferred, after which it was announced that an agreement in principle had been arrived at concerning the points arising out of clauses 27 and 29 dealing with the differential price in the outside areas.

Mr. HARKER, explaining the arrangement, said that the reference to the power to vary the differential in "any part or parts of a parish" was to be struck out of clause 27, which related to the Havant area, leaving the Company the right to have a different price in different parishes in that area. At no time was the price charged to be lower than that being charged for the time being in Portsmouth. As regards the new area to be added, apart from the area of the Havant Company, at the present time a supply was being given to certain parishes at a differential of 2·4d. and 1·8d.; and these were to be maintained. In the rest of the area, the differential proposed in the Order of 4⅜d. per therm was to hold good again, with the provision that there might be differences of differential below this figure in different parishes, but not in parts of parishes. At no time, however, was the selling price to be lower than the price charged in the Havant area.

There still remained several contentious portions of the Order; and Part VI., dealing with the additional capital, was taken next.

Mr. *Carmichael* said the liabilities of the Company on capital account were £132,276 on June 30. In addition there was the sum of £30,492, the cost of completing capital works now in progress, making a total of £162,768. The new capital now asked for, *plus* the unissued capital of the Company, would render available the sum of £435,522, after providing for the capital liabilities mentioned. The capital per 1000 c.ft. on last year's figures was 6s. 3d. per 1000 c.ft., or 1s. 4d. per therm; and he had calculated that in 1934, when this work was completed, the figures would be 6s. 4·1d. and 1s. 4·9d.—a very small increase indeed having regard to the conditions concerning cost of materials and labour.

Mr. WROTTESLEY'S first question in cross-examination was that, whereas the Company, which had been in existence for 100 years, had a capital expenditure of £740,000, it was now proposed to raise it to £1,246,000. Moreover, the capital charges per 1000 c.ft. were not being reduced by this increased capital expenditure.

Witness said the reason for this was the very much higher cost of labour and materials now compared with the earlier years.

Mr. WROTTESLEY suggested that the management of a well-organized company should enable it to get ahead of such a factor by means of improved machinery and methods.

Witness replied that the Company was working efficiently, and that the additional capital expenditure would enable it to work more efficiently and give a larger output, while the consumer would be better off, if his estimates were correct. If he were wrong in his estimate of progress, then the money would not be spent, because it would not be needed. Then the consumer would be no worse off. At the same time, he was convinced there were enormous possibilities in the area for development. They had only touched the fringe of the gas fire development; and though it might be true that the population had not increased materially during recent years, yet there was considerable scope for an increased consumption per head. Taking everything into consideration, he was convinced that his estimate of increase during the next ten years was a conservative one. Witness would not agree that the capital expenditure estimates were on the high side, and said that they had been worked-out on the basis of current prices, because he did not believe there would be any serious fall in prices for some considerable time.

Mr. SCHOFIELD put some questions suggesting that the special purposes fund and the renewals fund might give the Company a means for further capital expenditure.

The DIRECTOR said that the surplus funds from these sources would only be available for investment purposes.

Eventually it was decided that Mr. Cash should be asked questions on this point; and the inquiry was adjourned until Oct. 30, when it is to be concluded.

SOUTH AUSTRALIAN GAS COMPANY.

The annual meeting of the Company, which was held in the offices at Adelaide, on Aug. 27, was presided over by Mr. A. R. LUNGLEY.

The CHAIRMAN, in moving the adoption of the report and balance-sheet for the year ended June 30, said it was pleasing to note that the Company's progressive expansion has been maintained in all directions, in many of which new records had been created. Besides the continued demand for the supply of gas to new houses in the metropolitan areas, the volume of new business had been swelled through other channels, including the installation of many additional time and labour saving domestic gas appliances in houses previously served by gas, and also by the rapid increase in the demand for gas for industrial purposes. The following comparison would indicate the growth of operations over the past decade:

—	Year 1915.	Year 1925.
Coal carbonized	49,194 tons	82,320 tons
Gas made	608 mill. c.ft.	1,211 mill. c.ft.
Coke	32,000 tons	52,000 tons
Tar	640,000 galls.	1,389,000 galls.
Sulphate of ammonia	615 tons	970 tons
No. of consumers	23,000	50,000
Employees	436	876
Salaries and wages paid	£66,198	£232,058
Capital employed—		
Share	£397,736	£892,500
Loan	£80,900	£600,000
Total	£478,636	£1,492,500

While the increase in the number of employees was 100 p.ct., that in salaries and wages paid was 350 p.ct. This and the high price of coal were the principal reasons for the increased price of gas over recent years. In April last the new Woodall-Duckham vertical retort house, with a capacity of 1½ million c.ft. of gas a day, was put into commission at the Brompton Works, bringing the total manufacturing capacity of this station up to 5¼ million c.ft. a day; and the working results had fulfilled all expectations.

PRICE, &C., REGULATION.

Twelve months ago the Bill which resulted in the Gas Act of 1924 was first laid before Parliament, since which time the Directors and management had been closely and anxiously engaged in watching its progress. In its most vital clauses, which provided for the regulation of purity, quality, pressure, price, dividends, and reserves, it was generally on similar lines to gas legislation which had been in force for some years in the British Isles and New South Wales. The clause regarding the fixing of price provided that the President of the Industrial Court should, within six months of the passing of the Act, by public inquiry fix the standard price for the future. In the original draft of the Bill it was the Government's intention to fix an all-round standard price of 7s. As a result of the Company's representations, however, the Government agreed that the Bill should provide for the President of the Arbitration Court to fix the first standard price. The Company found that in several directions the new Act would increase expenses which, in conjunction with reduced prices anticipated for some of the bye-products, would involve an increase in the price of gas. They therefore applied for 6d. extra per 1000 c.ft. After lengthy argument, the President declared the first standard prices for the metropolitan areas to be 1d. per 1000 c.ft. higher than those at the time being charged. It was some satisfaction to record that the general result of the inquiry was the vindication of the Company as to the prices charged for gas; proof that the Company had been making strenuous efforts to keep down the price of gas; the dispelling of any idea that the Company were accumulating large undivided profits; and the removal of any misapprehension as to the Company's management and efficiency. Although the standard prices fixed would, as intended by the Act, reasonably ensure the present dividend, they were disappointing in that they allowed no margin for contingencies, and, further, were already limiting the Board in their policy of extensions of mains to meet the increasing demands of the public. A vital part of their future policy was the establishing of manufacture at Osborne—a step which had had careful consideration for some time, and which, with the increasing demands for gas, had become a matter of such urgency that the Directors could incur no further delay without running the risk of being unable to meet the growing needs of consumers. The standard prices just declared must, as well as limiting the Company in their extension of mains policy, lead to a modification of the original plans as regards the time by which concentration of manufacture at Osborne could be completed. The Directors expected to ask the shareholders to meet again at an early date to obtain authority for the raising of fresh capital.

The motion for the adoption of the report and accounts was seconded by Mr. C. R. J. Glover (Lord Mayor), and agreed to. A vote of thanks for their services was passed to the Chairman, Directors, Secretary (Mr. Gerald M. O'Dea), Engineer (Mr. S. Westall Durkin), and staff.

TRADE NOTES.

Parkinson Stove Company, Ltd.

The firm have published a new gas fire list for the coming season.

Hints on Working Aluminium.

The British Aluminium Company, Ltd., No. 109, Queen Victoria Street, London, E.C. 4, have published a booklet containing some very useful information on the working of aluminium tubes.

Tar Distillation Plant for Bolton.

The Woodall-Duckham Vertical Retort and Oven Construction Company (1920), Ltd., have received an order from Mr. McLellan, of Bolton, for a tar distillation plant on the "T.I.C." process, to treat 6 tons of tar per 24 hours.

Overheated Bearings.

Messrs. Sterns, Ltd., of Finsbury Square, London, E.C. 2, claim to have overcome this trouble by the introduction of a preparation called "Cooloricid." They say that the application of this compound to any overheated bearing immediately reduces its temperature to normal. At the recent Motor Show at Olympia the firm demonstrated the properties of "Ambrolyte," a new gear-box oil.

New "Bland" Catalogue.

The Bland Light Syndicate, Ltd., of 29, Little Trinity Lane, London, E.C. 4, have published a comprehensive catalogue of the goods they have to offer for the 1925-6 season. In the September issue of the "Salesman" attention was drawn to some of the firm's lighting appliances, but it may be mentioned here that the new list illustrates several types of cooker which the Bland Syndicate are placing on the market.

CONTRACTS OPEN.

Coal.

The Gas Department of the County Borough of Burnley are inviting tenders for the supply of gas coal. [See advert. on p. 182.]

Pipes and Specials.

The Town Council of Middleton are inviting tenders for the supply of cast-iron socket and spigot pipes and specials. [See advert. on p. 182.]

New Carbonizing Plant, and Demolition Work.

The Brighouse Corporation Gas Department are inviting tenders for the supply, delivery, and erection of a retort bench, handling plant, charging and discharging machine, &c.; also demolition work. [See advert. on p. 182.]

NORTH-EAST COAST COAL TRADE.

From our Own Correspondent.

The improvement in the general position in this market has been fully maintained during the past week, and values have tended to improve all round. The demand for prompt shipments has been considerable, and many buyers, unable to obtain supplies, have had to be content with turns for next month, with the result that many collieries are already in quite a strong position for November. Prices are quoted firmly up to the end of the year, and the general tone of the market is much improved.

A very satisfactory feature is a better demand for coke and coking coals, not only for export, but also from some of the manufacturing districts at home. Coking coal, which up to a week or two ago was obtainable in any quantities at 13s. and under, is now quoted steadily at 14s. to 14s. 6d. Activity in the coke market has also developed during the week, and prices are at least 1s. a ton harder for all descriptions.

Inquiries for gas coals are coming in steadily. An order has been received from Bordeaux, and Naples and Oslo are now in the market for deliveries up to the end of April. Quotations are steady at about 16s. 9d. f.o.b. for Wear Specials and best qualities, and seconds are distinctly harder at 14s. to 14s. 3d. Durham unscreened bunkers are good at 15s. to 16s. for good qualities.

COAL TRADE IN THE MIDLANDS.

From our Local Correspondent.

Trade continues slow. In the industrial branch there is no measurable expansion, so that the unbalancing caused by the seasonal improvement of the house coal trade and the larger production of slacks and smalls is somewhat accentuated. In these categories supplies are so plentiful that prices are unstable, depending on the circumstances of individual collieries. A more favourable view is taken of the industrial outlook. Whatever change for the better has accrued is largely sentimental. It is a hopeful omen, however, that one or two of the heavy engineering branches are less lifeless.

Transactions in iron and steel have been on a rather more encouraging scale. The blast-furnaces are still battling against a dragging market for pig iron; but Northampton houses are making a stand against further depreciation, and several of them are tentatively quoting higher prices. Nevertheless the position in regard to coke remains very weak. There is a slightly more active movement of gas coal, and the requirements of electric supply undertakings are on a growing scale. Neither in industrial nor household fuels are there any price movements of general significance. Minor adjustments are made as market fluctuations dictate. Difficulty is experienced in getting regular supplies of specific grades of household fuel. In such cases prices have advanced. Taken all round, however, collieries are very far from having recovered the initiative.

YORKSHIRE AND LANCASHIRE COAL TRADE.

From our Local Correspondent.

The demand for house coal has fallen off, but it is anticipated that normal early winter deliveries will be required within the next week or so.

The industrial situation has a more optimistic tone, although there is no weight of increased traffic at the moment. In some centres, however, manufacturers are looking forward to a slightly increased demand for their productions towards the end of the year.

There is apparently no great quantity of gas coal unsold, and contracts are moving regularly in accordance with the season.

The export section for the standardized brands continues to be firm, and although the commoner grades remain stationary, it looks as though the washed fuels produced in this country more than hold their own with similar sized fuels from the nearer Continent.

Humber bunker and export prices (f.o.b. usual shipping ports) are: South Yorkshire.—Hards, Association, 18s. 6d. to 18s. 9d.; screened gas coal, 17s. 6d. to 18s. 6d.; washed trebles, 19s.; washed doubles, 18s. 3d. to 18s. 6d.; washed singles, 17s. 6d.; washed smalls, 13s. 6d. to 14s.; unwashed doubles, 15s. 9d. to 16s. 3d.; rough slack, 9s. 3d. to 10s.; smithy peas, 19s. to 19s. 7d. West Yorkshire.—Hartleys, 16s. 6d.; screened gas coal, 17s. 6d.; washed doubles, 17s.; washed singles, 15s. 6d.; washed smalls, 12s. 6d.; unwashed trebles, 16s. 6d.; unwashed doubles, 13s. 6d.; rough slack, 9s. 9d.; coking smalls, 9s. to 9s. 6d. Derbyshire and Nottinghamshire.—Top hards, 19s. 6d. to 21s.; washed trebles, 18s.; washed smalls, 12s. 3d. to 12s. 9d.; rough slack, 9s. 6d. Yorkshire, Derbyshire, and Nottinghamshire.—Screened steam coal, 16s. to 17s.; gas coke, 20s. to 24s.; furnace coke, 18s. to 19s. per ton.

CURRENT SALES OF GAS PRODUCTS.

The London Market for Tar, Tar Products, and Sulphate.

London, *Oct.* 19.

A moderate amount of business is reported in pitch, and the price continues steady at about 42s. to 42s. 6d. per ton.

Creosote is perhaps slightly firmer at 7d. per gallon net and naked at works.

Phenol is in poor demand, and is weak at 4¾d. per lb. in drums.

Pyridine 90/140 is steady at about 19s. per gallon.

Solvent naphtha 95/160 is 1s. 10d. per gallon; pure benzole and pure toluole are 2s. 1d. to 2s. 2d. per gallon.

Tar Products in the Provinces.

Oct. 19.

There has been little alteration in the markets for tar products during the past week.

Pitch continues steady, although no sales of importance have been reported.

Creosote is still in fair demand.

Other products are somewhat neglected.

The average values for gas-works products during last week were: Gas-works coal-tar, 27s. 9d. to 32s. 9d. Pitch, East Coast, 40s. to 41s. f.o.b. West Coast—Manchester, 34s. 6d. to 35s. 6d.; Liverpool, 35s. 6d. to 36s. 6d. Clyde, 37s. to 39s. Benzole, 90 p.ct., North, 1s. 7½d. to 1s. 8¼d.; crude, 65 p.ct., at 120° C., 1s. to 1s. 1d., naked at makers' works; 50-90 p.ct., naked, North, 1s. 7½d. to 1s. 8½d. Toluole, naked, North, 1s. 6½d. to 1s. 7¼d., nominal. Coal-tar crude naphtha, in bulk, North, 7½d. to 8½d. Solvent naphtha, naked, North, 1s. 4½d. to 1s. 6d. Heavy naphtha, North, 1s. to 1s. 2d. Creosote, in bulk, North, liquid, 5⅞d. to 6d.; salty, 5½d. to 6d. Scotland, 5⅝d. to 5⅞d. Heavy oils, in bulk, North, 6½d. to 6¾d. Carbolic acid, 1s. 4d. to 1s. 5d. prompt. Naphthalene, £11 to £14; salts, £4 to £5, bags included. Anthracene, "A" quality, 2½d. per minimum 40 p.ct., purely nominal; "B" quality, unsaleable.

British Industries Fair.

The eleventh British Industries Fair, to be held in London and Birmingham from Feb. 15 to 26 next year, promises already in many ways to be the most successful, interesting, and representative one of the series. Although forms of application for space have been in the hands of potential exhibitors only a few days, over 100,000 sq.ft. of space has already been applied for, and new applications are being received daily by the Secretary. This exceptional demand is, no doubt, due to the fact that so many firms realize the advantage of exhibiting in a Fair on the advertising of which the Government have decided to expend the sum of £25,000 in a world-wide publicity campaign. Further, the charge for space has been reduced this year at both London and Birmingham. At the request of a large majority of exhibitors, it has been decided to admit the public from 5 p.m. to 8 p.m. each day, and on Saturday afternoon, to inspect the exhibits and see the many wonderful products of British industry.

Relief of Rates and Gas Prices at Stockton.—The Thornaby Town Council have protested against the Stockton Corporation's decision to increase the charge for gas. On Oct. 13, Mr. Oxberry moved a resolution suggesting that, in view of the fact that large sums had been taken from gas profits for the relief of Stockton rates, the deficit this year should have been met in the same way. Mr. Harris said that the Stockton Corporation plundered the gas undertaking to an extent which enabled them to avoid an increase of their borough rate. Now, apparently, they were having to raise the price of gas in order to pay for the £2000 devoted to the relief of the rates. This was a direct subsidy, and meant about £400 from the pockets of Thornaby people into the borough fund of Stockton. The resolution was carried.

STOCK MARKET REPORT.

THE heavy withdrawals of gold from the Bank of England last week brought about a complete alteration in the monetary situation, and caused a general weakness in the Stock Markets. In view of the important new issues which have been announced, this is a matter of serious import; and should the Bank Rate have been raised, there will be a serious check to such flotations.

The article on the country's economic position by Prof. J. M. Keynes, which appeared in the "Daily Express" on Wednesday of last week, attracted a good deal of attention, and his attack on the Bank's policy, or lack of policy, will, it is hoped, be followed by some declaration by the Bank or Government.

There is no improvement in the financial affairs of France, and it would appear to be impossible to prevent a further inflation of that country's currency failing a settlement of the Franco-American debt.

There was a general slump in the Industrial specialities which have been prominent for some time past. Profit-taking and the fear of a restriction in banking facilities were the main reasons.

The Gas Market now shows signs of improvement. Investors in this market will have noticed that their securities did not benefit by the prevailing cheap supply of money, and prices have been, and are still, very depressed. It will be observed from the Table, however, that there were movements in an upward direction in the stocks and shares of no less than nine companies. Considerable activity is still taking place in Primitiva shares. The quotation of the ordinary shares is now 12s. 3d.-13s. 3d.; and when it is remembered that the quotation after the re-arrangement of the capital of the Company was 7s. 6d. only, it will be seen that the market has confidence in their prospects. Among the new issues is the Pinner Gas Company's issue of £25,000 6 p.ct. irredeemable preference capital at the minimum price of par.

The following transactions were recorded during the week:

On Monday, Bombay 20s., Brighton and Hove "A" 135, Continental Union 39½ *ex* div., European 7½, Gas Light and Coke 79½, 79⅝, 79⅞, 80¼, 4 p.ct. preference 79½, 80½, 3 p.ct. debenture 60, Imperial Continental 149½, 150, Primitiva 13s., 13s. 3d., 13s. 4½d., 13s. 5¼d., 13s. 6d., 13s. 7½d., 13s. 8¼d., 13s. 9d., South Metropolitan 91, 91¼, 91½, 91⅝, 91¾, 92, Southampton 81⅛, Tottenham "B" 85. Supplementary prices, North Middlesex 5 p.ct. preference 89.

On Tuesday, Aldershot 4 p.ct. preference 72½, British 106½, 107 *ex* div., Commercial 4 p.ct. 80, European 7¼ £7 5s. 6d., £7 7s., Gas Light and Coke 79½, 79⅝, 80, 80¼, 80½, 4 p.ct. preference 79½, 3 p.ct. debenture 60¾, Imperial Continental 149½, 150, Montevideo 69, 69½, Primitiva 13s. 3d., 13s. 4½d., 13s. 5¼d., 13s. 6d., 13s. 7½d., 13s. 9d., 4 p.ct. debenture (1911) 65, 66, South Metropolitan 91, 6½ p.ct. debenture 102, South Suburban 5 p.ct. 95⅜, 96. Supplementary prices, Danish 4 p.ct. debenture 81.

On Wednesday, Bournemouth 6 p.ct. preference 11 9/16, Commercial 4 p.ct. 80, Continental Union 39½ *ex* div., Gas Light and Coke 79⅜, 79⅞, 80, 80¼, 80½, 3 p.ct. debenture 60¼, Imperial Continental 147, 150¼, 3½ p.ct. debenture 72, Primitiva 13s., 13s. 1½d., 13s. 3d., 13s. 4½d., 13s. 5¼d., 13s. 6d., 13s. 7½d., South Metropolitan 91¼, 6½ p.ct. debenture 103, South Suburban 5 p.ct. 96½, Southampton 5 p.ct. maximum 81⅛, 4 p.ct. debenture 74, Tottenham "B" 86, Tuscan 20s., Wandsworth "B" 108. Supplementary prices, Cambridge University and Town, fully-paid, 95⅞, Liverpool 5 p.ct. 82 3/16.

On Thursday, Alliance and Dublin 65, 66¼, 66½, 66⅜, 67 *ex* div., Brentford "B" 92, 5 p.ct. preference 97, European 7¼, Gas Light and Coke 80, 80⅛, 80⅜, Imperial Continental 149, Primitiva 12s. 6d., 12s. 10¼d., 13s., 13s. 1½d., 13s. 4½d., 4 p.ct. (Buenos Aires) debenture 64½, 65½, South Metropolitan 91½, 91¾, 91⅞, 92, 3 p.ct. debenture 59½, South Suburban 5 p.ct. 96½, 97, Southampton 5 p.ct. maximum 81⅞, 4 p.ct. debenture 74. Supplementary prices, Cambridge University and Town 5 p.ct. debenture 95⅝, 95⅞.

On Friday, Brentford 4 p.ct. debenture 78, British 105½ *ex* div., Gas Light and Coke 80, 80¼, 80½, 80⅜, Hongkong and China 19½, Imperial Continental 147, 148½, 148⅔, 149, 149⅜, Malta and Mediterranean 87s. 6d., Primitiva 12s. 3d., 12s. 7½d., 12s. 9d., 12s. 10½d., 13s., South Metropolitan 91⅛, South Suburban 5 p.ct. 96, 96½, 97⅛, Southampton 4 p.ct. debenture 73¼, Tottenham "B" 85. Supplementary prices, Aldershot new 4 p.ct. preference 73¼, 73½, Montevideo 5 p.ct. debenture 75½, Wandsworth 4 p.ct. debenture 79, 79¼.

The abundant supplies of loanable credit which have prevailed during the past few weeks were not so conspicuous last week. One result of the money stringency was that the Treasury had to pay over 6s. p.ct. more than last week for its Treasury Bills, and it is anticipated that the Bank Rate may have to be raised. A sharp rise in discount rates took place at the end of the week.

There was no recovery in the sterling-dollar rate, which finally closed at 4.84. French francs were uncertain, and the Paris cheque rose to 109.20, closing at 108.25. Belgian francs were 106.15, and Italian lire 120 7/16.

Silver was dull on China selling, and the price declined to 32⅞d. per oz. Gold remained at 84s. 11½d. per oz.

The Bank Rate is 4 p.ct., to which it was reduced from 4½ p.ct. on Oct. 1. Bankers' deposit rates are 2 p.ct. The deposit rates of the discount houses are 2 p.ct. at call and 2¼ p.ct. at notice.

Issue.	Share.	When ex-Dividend.	Dividends. Prev. Hf.Yr.	Dividends. Last Hf. Yr.	NAME.	Quotations. Oct. 16.	Rise + or Fall − on Week.	Transactions Lowest and Highest Prices.
£			% p.a.	% p.a.				
171,978	Stk.	Aug. 13	5	5	Aldershot 5 p.c. max. C.	75—78	..	..
295,402	,,	,,	4	4	Do. 4 p.c. Pref.	70—75	..	72½
1,551,868	,,	Oct. 8	6½	6½	Alliance & Dublin Ord.	63—65*	+1	65—67
374,000	,,	July 9	4	4	Do. 4 p.c. Deb.	60—65	..	..
300,000	1	May 7	1/7⅛	1/7⅛	Bombay, Ltd.	⅛—1	..	20/-
170,000	10	Aug. 13	8½	8½	Bournemouth 5 p.c.	12—13	..	..
425,050	10	,,	7	7	Do. B 7 p.c..	12—12½	..	..
150,000	10	,,	6	6	Do. Pref. 6 p.c..	11—12	..	11 3/16
50,000	Stk.	June 25	3	3	Do. 3 p.c. Deb..	56—59	..	..
162,025	,,	,,	4	4	Do. 4 p.c. Deb..	77—80	..	..
992,045	,,	July 9	6 1/16	6 1/16	Brentford A Con.	93—98	..	..
990,500	,,	,,	6⅛	6½	Do. B New	93—98	..	92
76,000	,,	,,	5	5	Do. 5 p.c. Pref.	94—97	..	97
506,690	,,	June 11	4	4	Do. 4 p.c. Deb.	76—81	..	78
181,337	,,	,,	6	6	Do. 6 p.c. Rich Red. Deb.	100—105	..	..
114,740	,,	Aug. 27	12½	12	Brighton & Hove Orig.	166—171	..	..
144,200	,,	,,	9½	9	Do. A Ord.	132—137	..	135
1,887,500	,,	July 23	5	5	Bristol 5 p.c. max.	89—91a	..	..
895,000	,,	Oct. 8	7	8	British Ord.	102—107*	..	105½—107
100,000	,,	June 25	7	7	Do. 7 p.c. Pref.	120—125	..	..
180,000	,,	,,	4	4	Do. 4 p.c. Red. Deb.	71—76	..	..
100,000	10	May 21	6	8	Cape Town, Ltd.	6½—7½	..	..
100,000	10	Apl. 23	4½	4½	Do. 4½ p.c. Pref.	5½—6½	+⅛	..
150,000	Stk.	June 25	4½	4½	Do. 4½ p.c. Deb.	69—74	..	..
626,850	,,	July 23	6	6	Cardiff Con. Ord.	98—101	..	..
237,850	,,	June 25	7½	7½	Do. 7½ p.c. Red. Deb.	101—104	..	..
137,130	,,	Aug. 13	6½	5	Chester 5 p.c. Ord.	90—95b	..	..
1,513,280	,,	July 23	5/14/8	5⅜	Commercial 4 p.c. Cap.	78—83	..	80
560,000	,,	,,	5⅜	5 3/4	Do. 3½ p.c. Cap.	78—83	..	..
475,000	,,	June 11	3	3	Do. 3 p.c. Deb.	56—59	..	..
800,000	,,	Oct. 8	—	4	Continental Union, Ltd.	38—43*	+3	39½—39¾
200,000	,,	,,	7	7	Do. 7 p.c. Pref.	87—90*	..	..
660,000	,,	Aug. 13	6½	6½	Croydon sliding scale	96—100	..	..
284,975	,,	,,	5	5	Do. max. div.	81—84	..	..
492,270	,,	Aug. 13	9	6	Derby Con.	107—109c	..	..
55,000	,,	June 25	4	4	Do. Deb.	74—76c	..	..
1,002,180	10	July 23	4	6	European, Ltd.	7—8	..	7½—£7 7/-
16,460,070	Stk	Aug. 13	5½	5½	Gas Light & Coke 4 p.c. Ord.	79—81	..	79½—80¾
1,600,000	,,	,,	3½	3½	Do. 3½ p.c. max.	60—63	..	..
4,062,235	,,	,,	4	4	Do. 4 p.c. Con. Pref.	77—80	..	79½—80½
4,761,930	,,	June 11	3	3	Do. 3 p.c. Con. Deb.	58—61	..	60—60½
130,000	,,	—	10	10	Do. 10 p.c. Bonds	..	..	..
42,000	,,	—	7½	7½	Do. 7½ p.c. Ilford Deb.	..	..	..
82,500	,,	Sept. 10	6½	6½	Hastings & St. L. 5 p.c. Conv.	90—95	..	..
258,740	,,	,,	5½	5½	Do. 3½ p.c. Conv.	71—76	..	..
70,000	10	Sept. 24	10	10	Hongkong & China, Ltd.	18½—19½	+1	19½
86,600	Stk.	Aug. 13	10	10	Hornsey 7 p.c.	132—11	..	..
1,976,000	,,	May 21	10	59	Imperial Continental Cap.	147—153	−1	147—150½
226,170	,,	Aug. 13	3½	3½	Do. 3½ p.c. Red. Deb.	70—73	..	72
235,242	,,	Aug. 13	6½	6½	Lea Bridge 5 p.c. Ord.	94—99	—	..
2,127,340	,,	Aug. 13	5½	5½	Liverpool 5 p.c. Ord.	82¼—82⅜b	+¼	82 7/8
600,000	,,	Sept. 24	7	7	Do. 7 p.c. Red. Pref.	101¼—103½b	..	..
165,736	,,	Aug. 27	8	9	Maidstone 5 p.c. Cap.	118—128	..	..
63,480	,,	June 25	3	3	Do. 3 p.c. Deb.	55—60	..	..
75,000	5	June 25	3	7	Malta & Mediterranean	4—4½	..	4½
541,920	Stk.	June 11	4	4	Montevideo, Ltd.	68—72	+2	69—69½
1,061,315	,,	Aug. 13	5	5	Newcastle & Gateshead Con.	71—72d	−½	..
300,929	,,	,,	4	4	Do. 4 p.c. Pref..	75½—76½d	..	..
589,705	,,	June 21	3½	3½	Do. 3½ p.c. Deb.	68—69d	..	..
15,000	,,	Aug. 27	12	13½	North Middlesex 10 p.c.	—	..	..
75,940	,,	,,	8 8/20	8 8/20	Do. 7 p.c.	—	..	..
300,000	Stk.	May 7	9	7	Oriental, Ltd.	100—105	..	..
188,120	,,	June 25	7½	7½	Plym'th & Ston'house 5 p.c.	108—113	..	..
60,000	50	Aug. 27	14	14	Portsea Island B	93—96	..	..
100,000	50	,,	13	13	Do. C	90—95	..	..
4,289,909	1	—	—	—	Primitiva Ord.	12/3—13/3	..	12/3—13/9
302,600	100	June 2	4	4	Do. 4 p.c. Red. Deb.	78—80	..	..
600,000	Stk.	July 23	4	4	Do. 4 p.c. Red. Deb. 1911	64—67	+1	65—66
193,744	,,	June 25	4	4	Do. B. Aires 4 p.c. Rd. Db.	65—67	+2	64½—65½
284,496	,,	,,	4	4	Do. R'r P'te 4 p.c. Rd. Db.	63—65	..	..
150,000	10	Sept. 24	6	6	San Paulo 6 p.c. Pref.	7½—8	..	..
125,000	50	July 1	5	5	Do. 5 p.c. Red. Deb.	42—45	—	..
270,000	Stk.	Aug. 27	5½	5½	Sheffield A	101—102s	..	—
419,968	,,	,,	5½	5½	Do. B	101—102s	..	—
1,047,000	,,	,,	5½	5½	Do. C	101—102s	..	..
90,000	10	June 11	6	4	South African	7—9	..	..
6,609,895	Stk.	Aug. 13	6½	5	South Met. Ord.	90—92	..	92—92
1,895,445	,,	July 9	3	3	Do. 3 p.c. Deb.	57—60	..	59½
734,000	,,	Sept. 10	6½	6½	Do. 6½ p.c. Red. Deb.	101—103	..	102—103
91,500	,,	Aug. 13	8½	8½	South Shields Con.	131—133d	..	..
1,127,795	,,	July 23	6½	6½	South Suburban Ord. 5 p.c.	95—98	+1	95½—97
368,837	,,	June 25	5	5	Do. 5 p.c. Deb.	95—98	..	..
647,740	,,	May 7	5	5	South'mpt'n Ord. 5 p.c. max.	80—83	..	81⅛—81⅞
121,275	,,	June 25	4	4	Do. 4 p.c. Deb.	70—75	—	73½—74
250,000	,,	Aug. 27	7	7	Swansea 7 p.c. Red. Pref.	100—102	..	..
200,000	,,	June 25	6½	6½	Do. 6½ p.c. Red. Deb.	101—103	..	..
180,000	,,	July 23	8	7½	Tottenham District A 5 p.c.	105—110	..	..
882,475	,,	,,	6½	5½	Do. B 3½ p.c.	85—90	..	85—86
150,000	,,	July 9	—	28/4	Do. 5½ p.c. Pref.	103—105	—	..
181,455	,,	June 11	4	4	Do. 4 p.c. Deb.	76—79	—	..
250,851	,,	Aug. 27	5	5	Tynemouth Con. and New	69—71d	..	—
197,394	,,	Aug. 27	6½	6½	Uxbridge, Maidenhead, & Wycombe 5 p.c..	93—98	..	..
88,330	,,	,,	5	5	Do. 5 p.c. pref.	93—98	..	..
91,800	,,	,,	6½	6½	Do. 5 p.c. Maidenh'd	88—93	..	..
30,000	,,	July 9	9½	8½	Wandsworth, Wimbledon, and Epsom— Wandsworth A 5 p.c.	125—130	..	..
255,636	,,	,,	7½	7	Do. B 3½ p.c.	107—112	..	108
392,955	,,	,,	6/9/6	5/19/0	Do. C and New	90—95	..	..
252,000	,,	,,	7½	6½	Wimbledon 5 p.c.	100—105	..	..
98,000	,,	,,	7⅛	7⅛	Epsom 5 p.c.	110—115	..	—
88,416	,,	June 25	3	3	5 p.c. Deb.	56—59	—	—

Quotations at:—*a.*—Bristol. *b.*—Liverpool. *c.*—Nottingham, *d.*—Newcastle, *e.*—Sheffield. * Ex. div.

Long Service with the Cardiff Gas Company.

Over half-a-century's service with the Cardiff Gaslight and Coke Company is to the credit of James McCarthy, who is now a plater at the Grangetown Works of the Company. To mark their appreciation of this fine record, the Directors decided to make suitable recognition of the occasion. On Thursday, Oct. 8, the Chairman (Mr. C. E. Dovey, J.P.) and the Directors personally congratulated McCarthy on his long tenure with the Company. They presented him with a letter of appreciation, signed by the Chairman, and also a monetary recognition. Mr. Dovey made happy allusions to McCarthy's faithful service for so long a period, and remarked that he was a splendid example to other workmen. McCarthy is the oldest employee of the Company, having entered their service in 1875, and has always been held in high esteem by the Company, the staff, and his fellow-workmen.

Gas Charges Reduced at Leigh.—The Leigh Town Council have decided to reduce the price of gas to 3s. 3d. per 1000 c.ft.

Grays and Tilbury Gas Company.—The Directors of the Company have instructed Messrs. A. & W. Richards to offer for sale by tender 2000 £10 6 p.ct. preference shares (irredeemable); the minimum price of issue being par. Tenders should arrive at the offices of Messrs. Richards, No. 37, Walbrook, E.C. 4, not later than 11 o'clock on Thursday, Nov. 5.

Tamworth Gas Light Company.—The Directors in their report for the year ended June 30 stated that there was a profit of £1368. A dividend of 7¼ p.ct. per annum on the old shares, and 5¼ p.ct. on the new shares, having previously been declared, the Directors recommended a similar dividend for the half-year ended June 30. The report was approved at the annual meeting.

Electricity Failure.—The municipal electric current in a portion of the Dublin central area failed on Friday night last, owing to a defect at the sub-station. One of the theatres was obliged to secure candles for footlights, and paraffin and other lamps for the body of the house. In three cinemas the audiences were obliged to leave; and in one or two restaurants and places where dances were being held the incident caused much confusion. Repairs occupied about an hour.

Gas Exhibition at Mexborough.—Last week Mr. C. W. H. Peat (Chairman of the Swinton and Mexborough Gas Board) opened an exhibition organized for showing in practical fashion the advantages obtainable by the use of gas for cooking and heating. Mr. Peat said that since the Gas Board had taken over the concern in 1911, the 3000 users, with a consumption of about 40 million c.ft. per annum, had grown to 5000 consumers, with a consumption approximately of 60 million c.ft.

Stalybridge Gas Exhibition.—A fortnight's exhibition was opened on the 12th inst. in the Gas Company's showrooms at Stalybridge. The exhibition, which has been organized by the Gas Company, in co-operation with Messrs. John Wright & Co., the Richmond Gas Stove & Meter Company, Ltd., Messrs. R. & A. Main, Ltd., and General Gas Appliances, Ltd., has attracted great interest in the town. The "Classic" gas grates manufactured by Messrs. John Wright & Co., and an attractive range of Richmond's popular "Silent" gas grates, form a conspicuous feature of the whole exhibit, which includes a good selection of equipment for cooking and heating. A liberal scheme for hire-purchase of gas apparatus is a progressive feature, which has added much to the attractiveness of the display, and upon which the Stalybridge gas undertaking are to be congratulated.

Reduction in Price of Gas at Birtley.—The price of gas in the Birtley district has been reduced by 3d. per 1000 c.ft.

Ideal Homes Exhibition at Sheffield.—The Sheffield Gas Company had a most attractive display at a recent Ideal Homes Exhibition held in the Drill Hall. The uses of gas for lighting, water heating, cooking, and general heating were demonstrated in an admirable way. The Company were responsible for the brilliant illumination, by 1000-c.p. low-pressure lamps, outside the Drill Hall, and for a flambeau gas flame at the top of the building.

Bitumen Mixing Plant for Douglas.—After two years' highly satisfactory working of the "Cascade" system of tar dehydration at the works of the Douglas Gaslight Company, I.O.M., a bitumen mixing plant and oil fractionating still have just been added by Messrs. Clayton, Son, & Co., Ltd., of Leeds. The three plants have been arranged to work independently or in conjunction with each other. A most successful start was made at the end of last month, and Mr. Batt (Engineer and Manager) is now in a position to supply any class of road spraying or binding material.

Pontefract Gas Exhibition.—A model bathroom, bedroom, and kitchen were among the interesting features of the gas display arranged in the Town Hall, Pontefract, under the auspices of the Chamber of Commerce Trades Exhibition, to which reference was made in last week's "Journal." A fine show of gas fires and cookers made by Messrs. Wilsons & Mathiesons, Ltd., and Messrs. John Wright & Co., was also to be seen during the period of the exhibition. Demonstrations of gas cooking were given; and the highly successful nature of this effort on the part of the Gas Department should be a great help to business in the present season.

Last week a fire occurred at the Barton-on-Humber Gas-Works, the engine shed being completely destroyed

As the provision of new gas lamps and service pipes will cost some £500, the Ottery St. Mary Urban Council are asking the Electric Light Company to state the terms on which they will undertake the public lighting.

The Halifax police have issued a public warning against a man between 60 and 70 years of age who visits houses declaring he represents a well-known Leeds firm of makers of gas burners, and takes orders for a burner which is to be a big saving. He also takes cash; but the goods are not forthcoming.

The Liskeard Town Council have resolved to enter into a three years' contract with the Gas Company for public lighting at 4s. 6d. per 1000 c.ft., instead of 5s. as at present. The Council decided to obtain information as to automatic controllers for lighting and extinguishing the street lamps, the adoption of which is proposed.

The Middlesbrough Corporation have decided not to accede to an application signed by forty householders for a supply of gas to Nunthorpe, a village a few miles away from the town. The Gas Manager reported that the nearest point of supply was in Marton, about 3500 yards from Nunthorpe, and as at least a 6-in. main would be required, the cost would amount to £2600. The Corporation decided that the cost of the extension was prohibitive at present.

During the last financial year there were 10,803 cookers in use in the district served by the Bolton Corporation Gas-Works, and the number of grillers in service was 30,197—a total of 41,000. The sale of cookers is increasing at the rate of 1000 a year. Nearly 800 gas fires were sold last year. Two years ago the Corporation Gas Department opened showrooms in Hotel Street. Since that time the sale of appliances has increased by 40 p.ct. compared with the year ended October, 1923.

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